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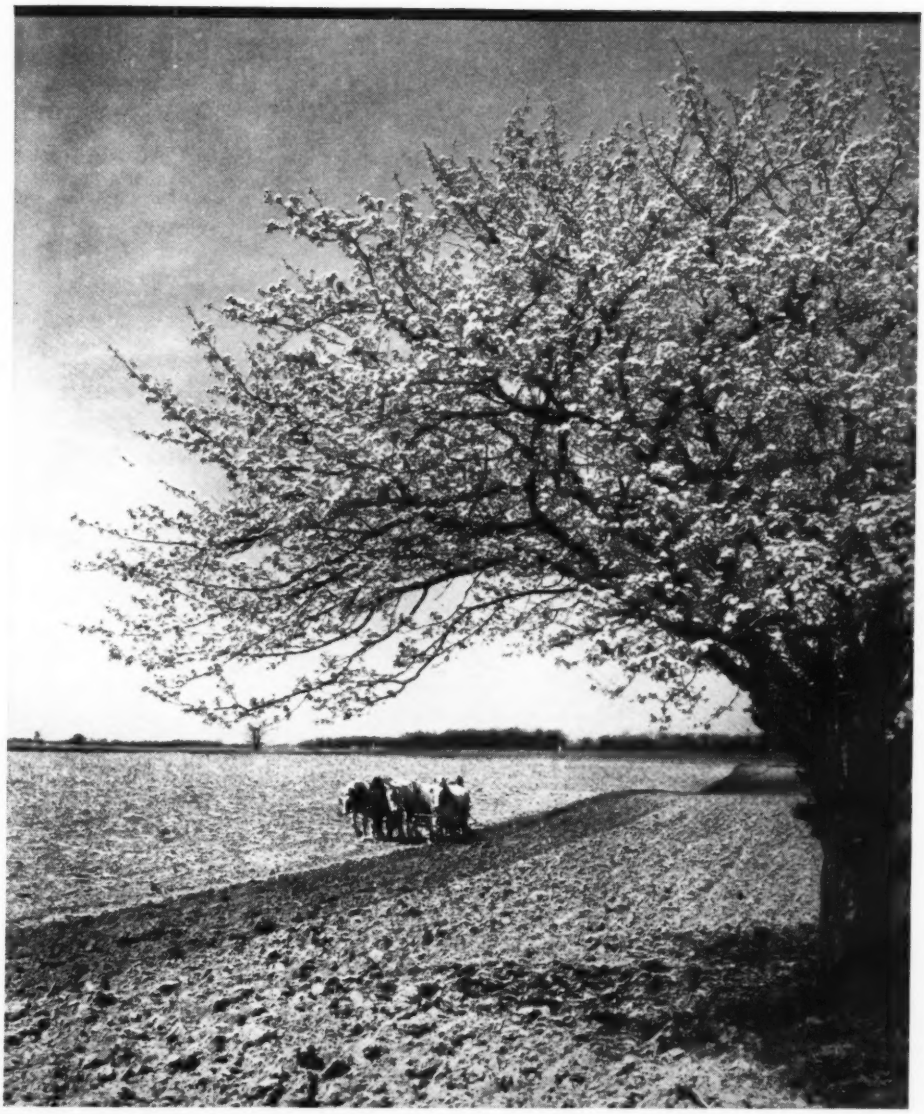

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AMERICAN POTASH INSTITUTE, INC.

INVESTMENT BUILDING **WASHINGTON, D. C.**

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

Editorial Office: Investment Bldg., Washington, D. C.

VOLUME XXIII NUMBER FIVE

TABLE OF CONTENTS, MAY 1939

The Family Man 3
Jeff Ponders on His Present Position

Potash Is Important to Farm Chemurgy 6
A Talk Before the Chemurgic Council, by Dr. J. W. Turrentine

Peat Land Farming in Wisconsin 10
Results of Experiments, by A. R. Albert

Twenty-five Years of Extension Work 13
J. Francis Cooper Pays Tribute

Ed Blaney Cashes in on Hybrid Seed Corn 17
A Success Story by Wilson Clark

Hershey Farms Find Potash Profitable 18
Careful Experiments Described by B. A. Rockwell

Editorials 27

Reviews 29

Foreign Agriculture 34

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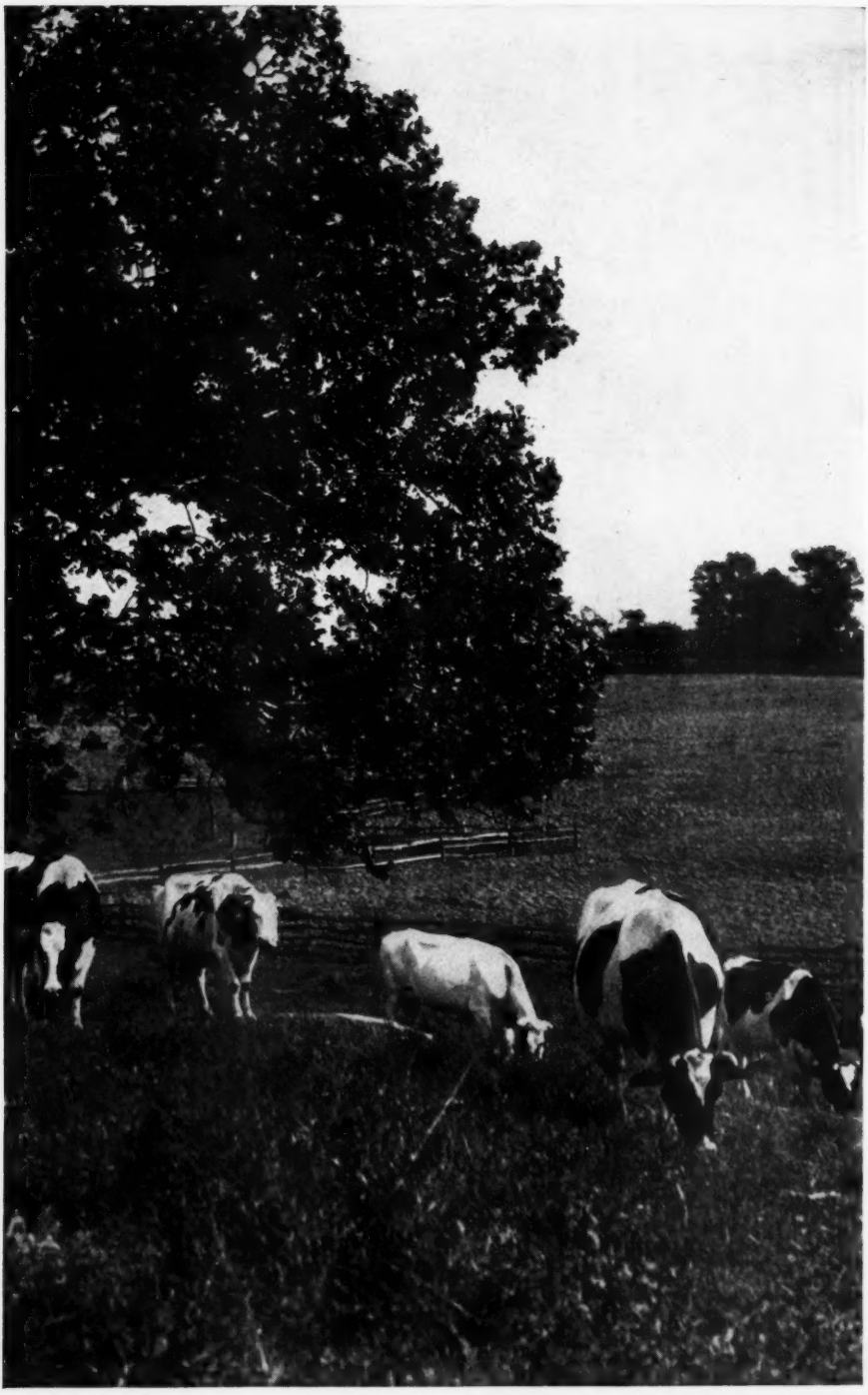

May pastures produce well-filled milkpails at a minimum of cow energy.

Better Crops with PLANT FOOD

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VOL. XXIII WASHINGTON, D. C., MAY 1939 No. 5

Times have changed for

The Family Man

By Jeff McDermid

WHEN we were young the Head of the Family sat down to dine beneath a frame of walnut holding within it the familiar motto, God Bless Our Home. But in these hectic days of war scares and stock jitters, dear old Pater Familias seldom dines without sensing that he hovers between his social security identification card and the orange and blue food scrip ticket. No wonder he gets more goose pimples than gravy.

Perhaps the old motto is laid away in the musty attic, tucked in the space between magazine files of the nineties and the stamp collection which Uncle Dud gave you when he hustled off to the Spanish-American war. If it would do us any mental good to tote it down and hang it above the sideboard again, I would dust it off and take a chance. But the lares and penates of modern family life do not often include such fragments of a mid-Victorian simplicity and callow faith.

In its place we more frequently see the engraved diploma of some professional academy or a card denoting that the Head of the Family is a staunch Rotarian. Mother and the girls have their sorority pledges framed, and the young scion of the line has his own notions of greatness embellished in athletic scrolls. Are we going Greek? Athens also had her era of worship of the perfect body and the social graces, while Olympic gods languished and the Romans armed.

The pattern of the ideal family man has changed. Even in the rock-ribbed stronghold of American tradition, such as we sometimes hope to locate off in the rural zones, one is up against the stern fact that the march of modernity has been ruthless. Yes, even the "rube" has met his Renaissance.

SO your devoted patriarch has bowed to the inevitable crush of circumstances. No longer may he take his lofty seat as arbiter and dictator combined, such as we once beheld among us in the old Germanic and Norwegian immigrant families. The newer life has intervened and has made men of jelly and girls of iron. It has switched the sexes, so to speak, and turned cement into putty for the masculine gender. The language used by the home folks is typical of the age, in which the "prunes and prisms" once pronounced by the neophytes of the parlor have given way to gamin gutturals and side-street slang. Anything goes when the old motto is gone.

Now this is often defended as a mark of true sincerity and absence of self-suppression. It is set over against prudery and slyness, twin sins of the age in which you and I were fetched up. I grant it is franker, sometimes just as decent, and in reality more relieving than the polite etiquette of Father's day. Yet it is pretty tough on the old stuffed shirt, to uphold tradition and dignity when decorum and restraint have vanished and the stream-lined jazz age has taken all the starch out of his assumed responsibility.

Another landmark to which the devotee of other days might fondly cling was the enlarged crayon portrait of some revered ancestor. In my youth such lugubrious lineaments were common to the sitting rooms of goodly burghers of our town. The peddling artist came and seized upon some tintype or other relic of a careless hour and promised to return it in a month fully restored and faithfully copied. He took a down payment and your note for the balance upon delivery, and thus the die was cast.

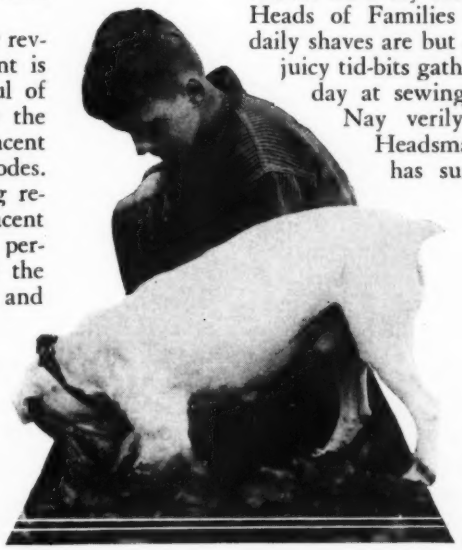
If English halls and baronies of Europe boasted their rows of knights in oil, you too, steeped in the heroics of a continental conquest, might also possess the treasure of a grandsire framed in gilt. You bought an easel, fragile and rococco, draped with changeable silk or rich brocade. On this the startling features of the noble nobody rested in its crime of greasy charcoal, sprayed with fixative and glaring with family pride. Few there were who wasted pity on the chore girl who did the dusting job or the invalid who had to sit all day and face the staring crayon orbs of him who heard 'Cump Sherman say that war was "hell."

At any rate the Head of the Family felt a sort of "ectoplasm" of spiritual force emanating from this awful visage on the easel, which became the sacred altar of domestic power. Reinforced by the frigidity and solemnity of the mighty mien, he launched his campaign of subjugation. Nothing like this defends his rights today. All the old albums are gone, and nothing remains to conjure up past memories save a few snap shots which few can find until too late to apologize about them. No wonder the sway of the patriarch has gone and the Head of the House has become the corner stone of the garage.

THE family man of my boyhood was proud of the farmer strain in his ancestry and upbringing, as well as full of useless vanity about his clan in general. To this end he erected a square frame barn with ornamental eaves and cornices, placing it about sixty feet behind the house, with rows of hollyhocks and sunflowers around it. At the front approach near the street there was the usual horse block and "iron nigger" hitching post. Of course, he might keep a tractor to mow his lawn today, but there's nothing in cold steel to keep one tuned to bucolic joys. It takes horse flesh, maybe a milk cow or two, and plenty of ammonia fumes.

The garage today is just like another room of the dwelling, and even has drapery on its windows when occasion demands. But when we were kids the

back yard barn was the retiring spot for the Head of the Family when some grouch or household misbehavior nettled his normal calm. There were bins for feed and rows of pegs for harness, and one might oil and soap the tugs whilst talking to a neighbor about Bryan, the Populists, and the march of Coxey's Army. The manure pile and compost heap gave vent to pent-up muscular vehemency, and small boys with black marks against their record were escorted thitherward for admonition.



Such a place for reverie, and retirement is a balm to the soul of man. Such were the smelly barns adjacent to our erstwhile abodes. No man can long remain a self-complacent and dominating personality without the whiff of horse hair and cow dung, steeling him to renounce the frills of parlor magic and the cozenage of female charm. Like the old-time barber shop, it was the zone of man's teetotal independence and the realm of empire-making schemes. Now that all we have left is the scheme and not the empire, things are not so happy with the harassed Head.

Nowadays if a gent who pretends to boss a family has an income tax to pay and a place quiet enough to figure out its evasion properly, he thinks he is lucky; hence "away back when" our men folks did not ponder on such monstrosities, and swearing was reserved for barns and barber shops.

Of course the barber shop and the corner saloon were the middle class clubs of my younger days, and much sought after by family men in search of camaraderie. Joe Curtis presided over the bowls and scissors in the basement below Graham's drug store. Thence we youngsters went for occasional hair cuts and glimpsed the rows of initial mugs which held full sway before the safety razor craze made the barbers seek the female trade. Female trade wrecked the last vestige of this fond retreat. The literature which once littered the ancient barber shops catered to the prize ring, the turf, and the silken thigh. What was naughty then and edited for male attention would not be noticed now among the gaudy nudist leaflets strewn on every rack. Stories told by Heads of Families waiting for their daily shaves are but dim replicas of the juicy tid-bits gathered by the gals today at sewing club and bridge. Nay verily the once proud Headsman of the Hearth has surrendered the last source of his inner power—the joy of being rough and common with his "hair let down." Without it he has no relief from the grind of self-effacement and inferiority. Like the dear old pink gazette itself, our horizon has shrunk and shriveled from forty rounds of John L. to half a round with Roper. And even in the burlesque show the professor has quit the shady shimmy and entertains his audience with endocrine glands and hormones.

Frankness and too much science combined have robbed the fellows of their personal privileges enjoyed apart from sissies and mixed society. Dad has become a decadent drifter.

I CANNOT speak as fully and frankly about the saloon, but which I believe had sawdust on its floors like Gottlieb Kulick's butcher shop. Beer can rushing in my environment was not so popular as in some other towns, so the Family Heads sought their solace in per-

(*Turn to page* 47)

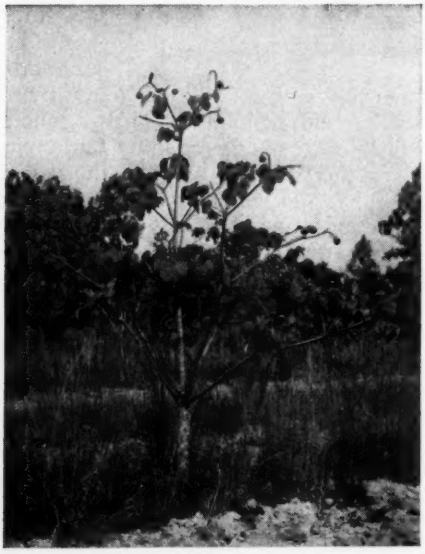
Potash Is Important To Farm Chemurgy*

By Dr. J. W. Turrentine

Washington, D. C.

IT is an honor deeply appreciated, to be invited to address the National Farm Chemurgic Council and its many supporters and adherents on this the occasion of its Fifth Annual Conference. And it is a pleasure, as always, to visit this beautiful Capital city of a great State which is showing such marked aggressiveness in the scientific rehabilitation of its agriculture. This State's enthusiastic espousal of the Farm Chemurgic enterprise is only one instance of many where it has grasped opportunities to improve the economic status of its farmers. Its progressive attitude toward farm problems, its scientific research in soil fertility and crop production, soil conservation, diversified farming, livestock production with scientific pasturing, combined with its State-wide and highly efficient educational system reaching all classes of the rural population have attracted nation-wide attention. It is fitting indeed that the Capital of such a State be chosen as the meeting place of an organization such as the National Farm Chemurgic Council, a State in which both we and our ideas are received with such marked hospitality.

* An address given before the Fifth Annual Conference of the National Farm Chemurgic Council, Jackson, Miss., March 29-April 1, 1939.



Unfertilized tung tree the same age and on the same soil as the one on the right.

Our President, Mr. McMillen, in assigning my subject suggested that I stress the importance of potash fertilization in its bearing on farm chemurgic crops and cite the potash industry of the State of New Mexico as a new Southern industry of importance to the nearby Southwest, as likewise to the agriculture of the entire Nation, a new chemical industry which has been developed within the past 10 years. With respect to both potash and chemurgy I might claim an interest resulting from 27 years of research activity in and out of the U. S. Department of Agriculture.

The present position of potash in agriculture is the result of research on the part of the agronomists and soil chemists of the Nation and their teachings, combined with the results obtained by the farmers who have followed those teachings—teachings based on a full

consideration of the farmer's economic welfare. The basic need of potash on the part of the farmer is founded, therefore, on the painstaking research of hundreds of agricultural scientists studying crops and soil types of the greatest variety under the many climatic conditions existing in this country, research inaugurated some 70 years ago and still being carried on in ever increasing volume. The present discussion is based on those teachings.

Current Potash Tonnage

The farmer's response to these teachings may be measured by his current use of approximately 900,000 tons of potash salts per annum in the growing of his crops, for the most part mixed with other plant-food compounds of nitrogen, phosphorus, calcium, and magnesium, i.e., commercial, mixed fertilizer. Such a tonnage is evidence of his appreciation of need for this essential plant food. Further evidence is the fact established by long-range, statistical analysis, that his purchases of potash vary closely with his cash income. In other words, this tonnage is not a full measure of his appreciation, as his use of potash is restricted by his economic status.

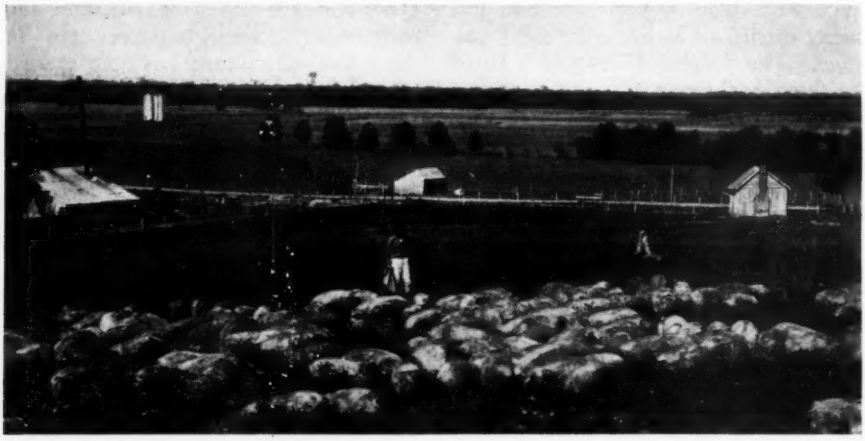
The basic need for potash is better appreciated when it is noted that on the average 35 pounds of potash salts per acre are removed by the harvested crop per annum, and where the soil is deprived of a protective cover crop, the loss from leaching may amount to an additional 100 pounds. This is *available* potash, this year's supply. In addition, erosion removes non-available potash minerals, the supply for future centuries, equivalent to 320 pounds per acre per annum. These figures, based on the comprehensive survey conducted by the late Dean J. G. Lipman of the New Jersey State College of Agriculture, can represent only broad averages, since they vary with crops, soil types, and farm practices. Nevertheless, they serve to indicate the appalling rate at which the soils of America are being depleted of an essential fertility element.

This process of depletion has already advanced not only to the point where crop yields have declined, but in addition plant abnormalities have resulted, now commonly recognized and accepted as potash deficiency symptoms. These symptoms are appearing wherever the soil-mining process, so prevalent in American agriculture, has been carried on long enough, and that includes most of the humid and some of the semi-humid regions. The outstanding instance of potash deficiency in the South is the so-called cotton-rust, a common phenomenon frequently resulting in the complete defoliation of the cotton plants of an entire field, prematurely ending their life cycle with reduced yields, undeveloped bolls that are hard to pick, and low grade lint.

The testimony of the growing plant is now being confirmed by the soil chemist through the application of the short analytic methods recently devised, whereby is determined relatively easily and rapidly the soil's content of potash and other elements in forms that are

Tree fertilized with 100 lb. of muriate of potash and 200 lb. of superphosphate per acre.

readily available for crop use as contrasted with those locked up in non-available form. Surveys on this basis confirm soil depletion not only on the lighter soils of the Coastal Plain where long recognized, but also on the heavier soils of the interior where State pride



Hogs thrive on legume pastures in the South.

frequently has prompted belief in soil inexhaustibility.

The depletion of American soils is no new story. On the contrary, it has become so well known that the nation is now spending millions in well-planned and comprehensive efforts at soil restoration — the prevention of erosion, the conservation of soil moisture, reforestation, and the growing of cover crops, particularly legumes, to improve the fertility of the soil, a program in which 65% of American farm acreage is now cooperating. None of these devices, however, can restore the potash to the soil once it is removed, as it cannot be synthesized, as can nitrogen compounds and the weathering processes whereby it is released from the insoluble potash minerals, if present in the soil, are too slow to meet the crop's requirements. But even if they were not so slow, soil depletion would not be arrested.

With this problem this Council must be vitally concerned. The chemist operating a chemurgic plant will expect, possibly require, raw materials from the farm at the lowest possible price. He will endeavor to manufacture his products at the lowest possible cost. But he knows in advance that for low cost production he must have a plant of the maximum efficiency in design, construction, method, and operation, plus ample working capital.

The same applies to the chemical plant in which are produced his raw materials, namely the farm. Without elaborating the analogy which is self-obvious, it is sufficient to point out the well-established fact that for cheap production a fertile soil is a prerequisite. For the average farm that means soil restoration, and for all farms, soil preservation. On any other basis the chemurgic concept is foredoomed to failure, together with the farmer whom it is designed to help.

A Subsistence Diet

The only known method of restoring potash to the soil is to transport potash salts from those places where they have been deposited by nature abundantly and in concentrated forms, and apply them to the soil in amounts and combination as taught by the farm advisers

to be economically efficient. If these teachings are to be followed, however, they must and do take cognizance of the farmer's restricted purchasing power and, therefore, deal with those limited quantities designed to yield the season's crop, at best a subsistence diet yet at that one which the average farmer feels unable to provide in the quantities prescribed.

To illustrate, during a recent season, the cotton farmers of the four States, North Carolina, South Carolina, Georgia, and Alabama, used only 100,000 tons of potash salts, as contrasted with the more than 200,000 tons they would have used had they been able to follow the official State recommendations. In the Middle Atlantic and Northeastern States only one-tenth of the potash so recommended was being used. In eight Midwestern States the potash removed by the corn, wheat, oats, and alfalfa crops alone exceeded the total used in the entire United States, to replace which less than 10% was applied on all crops grown in all of the Midwestern States. In such a situation no surplus is provided and rarely contemplated for a reserve supply.

The potash phase of soil restoration is, therefore, as yet hardly touched.

Soil-building with Legumes

The growing of legumes may be spoken of as the backbone of the soil-building program. In the South fortunately by growing winter vetch the winter months can be utilized for this crop, thus saving a year in rotations with other advantages equally important. But in the growing of legumes, together with lime on acid soils and phosphates if deficient, potash is a basic need as revealed by the plant's own appetite. For example, alfalfa and clover remove from the soil four times as much potash as phosphate, lespedeza twice as much, cowpeas and soybeans three times as much, and velvet beans and winter vetch four times as much as revealed by chemical analysis. The legumes are in fact among the high potash-consuming crops, and for their successful growing potash must be supplied. Where turned under for soil enrichment this potash, with some loss, together with the nitrogenous and organic matter synthesized, are available in ideal form for the succeeding crop. Where removed, the legumes, from the potash viewpoint, are soil-depleting crops of the first magnitude.

Prevent Potash Leaching

The legumes have a bearing on the potash problem not frequently emphasized. While much potash is required in their successful growing, a 4-ton per acre alfalfa crop, for example, utilizing 350 pounds of potash salts, which if deficient must be supplied, legumes (as a characteristic of effective cover crops in general) tend to conserve that potash already in the soil through the reduction of leaching and erosion. Lysimeter studies have shown that a cover crop of legumes will reduce potash loss from leaching by 50%, while erosion control methods adopted and taught by Federal and State soil conservation services have been shown to reduce erosion losses to practically nothing.

To illustrate from a typical test, a fallow plot during a 12-hour rainfall lost 13 tons of soil per acre, which a cover crop of red clover reduced to only 89 pounds, soybeans to 30 pounds, and grass to 10 pounds. From the many similar data now on record it becomes obvious that soil depletion through erosion can be practically stopped by the growing of legumes and other cover crops. Potash added in their fertilization, therefore, yields a several-fold return in the potash conserved.

This program has now advanced to the point where 41,000,000 acres are protected by cover crops of legumes and grasses. Assuming that leaching is reduced by 50% and that the potash utilized by the cover crop is returned to the soil, this represents an annual saving of 4,000,000 tons of available potash salts.

(*Turn to page* 44)

Peat Land Farming In Wisconsin

By A. R. Albert

Hancock & Coddington Branch Agricultural Experiment Stations, Hancock, Wisconsin

PEAT or muck soil can produce remarkable crops provided it is supplied with potash. Experiments and experience show that potash application is the first essential to success with peat soils. In fact one may, at fair produce prices, realize as much as 300% return upon an investment in potash on peat soil which has never been fertilized or manured.

The amount and frequency of potash applications are determined by kind of crops grown and nature of crop material removed from fields. Crops through which vegetative material is removed, such as hay, silage corn, and binder-cut grain, tend to remove large amounts of potash. For example, we found that 150 pounds of potash on a 4-year rotation were inadequate to maintain maximum production and increased the application to 300 pounds, applied twice per rotation, thus making 75 pounds of 50% potash per acre per year.

This seems to be adequate, or nearly so, for general farm crops in a normal rotation. It will probably not be enough for such crops as Reed Canary grass, which may produce 3 to 4 tons of hay per acre per year, nor will it be enough for intensive cropping to potatoes and roots. The frequency of application is a matter of choice with the farmer. Leaching losses on peat soil are of small consequence, and sometimes it is desirable to make large applications of 400 to 1,000 pounds of high-analysis phosphate and potash per acre upon intensively cultivated crops and then permit other crops to feed on residues.

Carrots ready for topping. Shape, size, and quality of roots are excellent. Yields range from 400 to 1,000 bu. per acre. An application of 400 lb. 0-9-40 fertilizer per acre was used.

Phosphates have been used with potash, and our experience during the early stages of our fertility plots was unfavorable to the use of phosphates. The raw rock phosphate produced practically no effect one way or another, but superphos-

phate tended to cause grain to lodge and consequently resulted in smothering of the hay crop seedings and so caused lower grain and hay yields.

During recent years, however, and after 15 to 20 years of cropping, superphosphates, and raw rock phosphate to a lesser extent, have given distinct benefits upon sunflowers and Reed Canary grass. Our rate of application per acre every 4 years has been 64 pounds of phosphoric acid in superphosphates and 250 pounds in rock phosphate. Superphosphates have also given distinct benefits on potatoes, but are less profitable per fertilizer dollar than potash treatments.

Cutting a 3-ton crop of Reed Canary grass which had been fertilized with phosphate and potash.

Tested Crop Needs

Lime applications have been tried without generally significant results in the glacial drift area of Wisconsin, but where the peat soils are very sour in the driftless area, beneficial results have been secured with certain lime-loving crops. Nitrogen fertilizers in conjunction with phosphate and potash have been tried from time to time without consistently and significantly profitable yield improvement.

Some trials with minor elements, such as copper, iron, manganese, and magnesium, have been made upon carrots without significant yield improvement. This was on a peat soil with a slightly acid reaction on which no responses to lime treatments were secured. The question is not answered, however, for all minor elements, for all crops, or for all time.

During early operations on this peat soil, experiments were made with canning beets, sugar beets, onions, and similar crops, using on them different fertilizer combinations at what were then considered somewhat above normal applications. For the most part, results with these trials were not conducive to further effort. In late years, however, we have discovered that we were not using sufficient amounts of fertilizer. We had been applying between 200 and 500 pounds per acre, but found that we could not grow a satisfactory onion crop unless we used 1,000 pounds, and even 2,000 pounds of high analysis fertilizer per acre. Perhaps if we should return to growing sugar beets and canning beets with heavier fertilizer treatments, results might be more encouraging.

The method of application may vary with different crops. In general, maximum returns per fertilizer dollar are obtained from row applications. Potatoes profit by 400 to 500 pounds of a high potash fertilizer in the row. Onions were not injured in 1938 by 1,000 pounds of 0-13-30 per acre applied beside the row. Fertilizer injury to seedlings is possible but not common on these highly buffered soils. Recently,

application about an inch below the seed has given excellent results.

The frost hazard on Wisconsin peat soils varies considerably between the northern and southern portions of the State. In central Wisconsin, where it is quite possible for frost to occur any month in summer, and where it has frequently occurred during the middle of June and the latter part of August, some of the most satisfactory crops are sunflowers for silage, peas, early potatoes, carrots, rutabagas, turnips, onions, and grasses for hay and pasture. In recent years Reed Canary grass has become quite popular, with some farmers claiming it is an excellent hay and pasture crop and others not liking it quite so well. Like other new crops, Reed Canary grass will have to find its place in the farm scheme. Corn is an excellent crop where the frost-free season is long enough, but rather hazardous in central Wisconsin. Grain crops are generally unsatisfactory in that all are subject to lodging; barley is subject to frost; spring and fall rye are subject to ergot which is probably carried over in the many grasses thriving along waste banks and fences. Nevertheless, we have a 5-year rotation in which the average oat production is about 42 bushels per acre over a period of 12 years or more. Early-maturing oats seems to be our most satisfactory spring grain.

Peat soil is very well-adapted to special crop production. The frost hazard to delicate crops, possible excessive moisture damage to all crops except grasses, and also danger of introduction of plant diseases and pests through intensive cropping deserve attention. Special crop production demands close attention from operators, good markets, and many other conditions. The question may well be raised whether it would be more advantageous to strive toward intensive cultivation of peat soils or toward a more diversified type of utilization.

Soil Becomes Depleted

Under intensive cultivation, and for that matter under the average 3- or 4-year farm rotation, there is a destruction of peat soil and its consequent subsidence. This is observable on the Coddington Experiment Farm after only 20 years of operation. Whether or not

(*Turn to page* 42)

Sunflowers on peat in central Wisconsin. Left: Untreated. Right: 150 lb. potash on corn in hills, 150 lb. potash on grain.

Twenty-five Years Of Extension Work

By J. Francis Cooper

Extension Editor, University of Florida, Gainesville, Florida

IN 1914, while seething war clouds hovered over Europe, ready to release a torrent of shrapnel, bullets, and cannon ball from which the world has not yet recovered, the United States Congress passed the Smith-Lever Act which set up the present system of cooperative extension work. For a quarter century cooperative agents of county, State, and Federal governments have rendered daily service to American farms and rural homes which has helped to build not only better farming but also, and more important, better rural family life and improved American citizenship. Its building process has been the exact antithesis of destructive war.

Early in May, as near as possible to May 8, the date the Smith-Lever Act was passed, some 3,000 counties where farm and home demonstration agents are employed staged celebrations of the silver anniversary of extension work. State and national extension officials checked their records and counted accomplishments of the first quarter century, as well as charted their course for the future.

Although it is officially just 25 years old, cooperative demonstration work actually began in Texas in 1904, 35 years ago. War clouds were not threatening, but a foreign enemy was invading the Southland, causing consternation among cotton growers whose fields it was ravaging. The boll-weevil army was on the march—a tiny enemy 'tis true, but one which was difficult to combat, if not invincible. And yet it proved to be an enemy which brought about great good to the country which it invaded, and even was the subject later of monuments erected in some Southern States (Texas and Georgia) for the service it had rendered in forcing crop diversification onto a one-crop land where cotton had reigned as king for decade after decade. It was said that "good came from evil, even the boll-weevil."

Founded Extension Work

Throughout the country homage is paid to Dr. Seaman A. Knapp as the founder of extension work, although he died April 1, 1911, before Congressional action provided definite, centralized financing and direction for the activity. Ideas, ideals, and inspiration for the innovation came originally from this great agricultural leader, teacher, and preacher whose previous career in the North had covered 70 useful years. No young Lochinvar out of the West was he.

After serving for 6 years as professor in agriculture at Iowa State College, in 1884 he became president of that pioneer institution. While on its staff, he is credited with having drafted the bill introduced in Congress by Representative Hatch of Mississippi, under which agricultural experiment stations were authorized, so he played a part in the present agricultural research system as well as that devoted to extension.

Dr. Knapp believed that crop diversification in the Southern States and endeavor for subjugating the boll-weevil required methods by which farmers could be shown how to do things. Foundations for the effort had been safely laid with scientific inquiry and research discoveries, but the meanings possessed by these must be translated into the language used between the plow handles before the desired results would follow. The experiment stations had no coordinate means whereby the results of their investigations would be carried onto the farms where pressing problems needed solving and research often had the right answer.

And so he conceived and put into execution demonstration work with farmers, boys' corn clubs being organized under his direction in Texas in 1908 and girls' tomato and canning clubs coming into existence in South Carolina and Virginia in 1910, and all being merged in 1914 into cooperative agricultural extension services which reach men and women, boys and girls of the rural areas. Credit for the tomato clubs goes to Miss Marie Cromer of South Carolina and Miss Ella G. Agnew of Virginia.

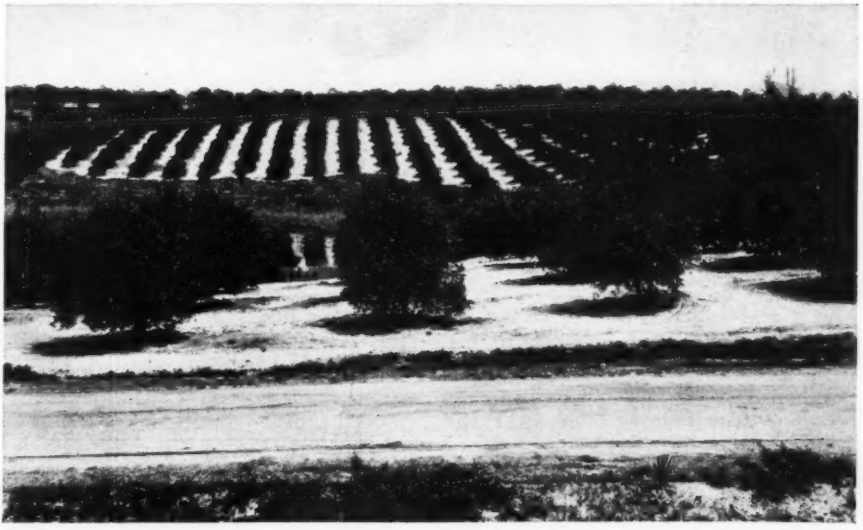
Results obtained from the Knapp system of demonstrations were so satisfactory that the entire boll-weevil area took new courage. United States Secretary of Agriculture Wilson placed additional funds at Dr. Knapp's disposal, but they could be spent only where the pest was seriously prevalent. General Education Board officials, with Rockefeller money, came to the rescue with funds to be spent under department direction but in any State. Called to Washington and placed in charge, Dr. Knapp extended the demonstrations all over the South. Sears, Roebuck and Company duplicated sums of $1,000 or more raised privately in many communities, both North and South. The Bureau of Plant Industry supervised the work in its early days.

Beginning in a modest way in the South, the service soon spread to other parts of the United States and is now conducted in its possessions. But it is

Cover crops are grown on thousands of acres of land as a result of demonstrations. These Austrian winter peas and vetch, grown as a winter cover crop in H. J. Wells' pear grove at Chipley, Florida, are ready to be turned under.

still strong in the South. Recent reports state that there are 4,121 county agricultural agents and assistants, with 2,060 of them in the South; of the 2,142 home demonstration agents, 1,257 are in the Southern States. However, the South has only 403 of the 1,516 specialists engaged in extension work.

The Department of Agriculture has determined that 20 of its employees have been continuously engaged in extension work since May 8, 1914, and that 182 employees in 38 States have a similar "roll of honor" record.



Records on Florida citrus groves kept by the Extension Service showed fertilizer to pay greater returns than any other practice. Demonstrations have helped growers to cut costs of production without decreasing efficiency.

The agents extend their good offices alike to newcomers of an area, old-time residents there, and those in between. They deal with soils and fertilizers, seeds and varieties, culture and harvesting, control of pests affecting both animals and crops, feeds and feeding, improvement of breeds of animals, marketing, forestry, gardening and orcharding, home improvement and grounds beautification, sewing and clothing, foods preparation and conservation, nutrition and health, recreation, organization, and anything else affecting rural welfare and progress.

The nation's farming, as well as its other activities, is filled with emergencies. The World War, coming a few years after the extension organization began functioning, gave it a baptism of emergency fire which proved its capabilities in the field. Production of more foods and conservation of those existing were the uppermost thoughts of the time, from a farming standpoint. The farming public and the agents rose to the emergency in style so proficient as to be almost awe-inspiring.

Cessation of hostilities was followed by a period of drastic readjustment. The farm production machine was geared to high speed, had to be slowed down to meet demand conditions. Economies in both marketing and production were necessary in the face of shrinking world markets. Drastic economies were obtained without adversely affecting efficiency, even increasing it in many cases.

Outbreaks of various plagues from time to time have given additional

Work of the 4-H Clubs trains boys and girls to be patriotic as well as proficient. The flag-raising ceremony at Camp Timpoochee, Florida, is an impressive part of the early morning program every day.

worry, and added scope for service by county agents. Every one has been met with vision, courage, and facility.

When the agricultural adjustment program was launched in 1933 the country's county agents were given an extra assignment which is still keeping the noses of many to the grindstone, causing some of them to break down prematurely from overwork, and others to neglect their regular lines of demonstration activity. But whenever extraordinary situations arise, it is a matter of course to press the county agents into the duty, with assurance that it will be performed well.

Dr. Knapp realized that adult farmers could be persuaded to change their practices only with difficulty and that boys and girls, who were more easily influenced to try new and improved methods, offered a fertile field for progress. As Dr. Knapp said, "Youths with the open-mindedness characteristic of boys but who have been given some training in the fundamentals of better practices afford the happy solution for the problem. Change they will not resist, neither adopt simply because it offers something new. In clubs devoted to specific purposes, thousands of boys can be partially trained as compared with scores who may receive a complete agricultural college education."

4-H Clubs Grew Rapidly

From their beginnings in 1908 and 1910, the clubs grew like Jack's bean stalk. Dr. C. W. Warburton, director of extension work with the USDA, recently announced that they had a membership of 1,286,029 in 1938, and that approximately 7,500,000 young people have received 4-H training since 1914. More than 40 per cent of rural boys and girls old enough to enroll were carried on the rolls last year, and three-fourths of them completed their projects.

Placing emphasis on training of the head, hands, heart, and health, the organization aids rural boys and girls in making the country a better place in which to live. Better crops, more efficient farms and farm homes, more healthful and attractive homes, more social activities and recreation for the

(*Turn to page* 38)

Ed Blaney Cashes In On Hybrid Seed Corn

By Wilson Clark

Madison, Wisconsin

ED BLANEY, a 38-year-old dairy farmer of Dane County, Wisconsin, is making more money on his sideline than he is from his milk business. Last year he raised 3,200 bushels of hybrid seed corn which netted him about $4 a bushel. This year he hopes to raise more than 4,500 bushels on the 125 acres for which he has contracted. Starting with only a single acre in 1933, he has increased his plantings each year, until his corn business now takes more of his time than his cows do.

His 160-acre farm of Carrington silt loam is located about 4 miles south of Madison. The soil is kept in excellent condition by the liberal use of commercial and farm fertilizers. Manure is put on during the winter and disked in before plowing begins, in April. He likes to allow a week or so between plowing and planting, so that the weeds can come up and be harrowed out before the corn is put in. This extra dragging also helps to put the seed bed in better condition and breaks up clods.

"We usually keep one tractor at the plowing day and night, if we can," he explained, "in order to get the job done early." Continuing, he says, "We generally check-plant the corn, with a fertilizer attachment on the planter. We put on 100 pounds of 3-18-9 fertilizer per acre, using a split-row boot which drops the fertilizer on each side of the seed. I like this system better than drilling it in, because it puts it where the plants can get it, and not so much is needed to get results. Then when the corn is 6 or 8 inches high, it is side-dressed by means of a fertilizer attachment on the cultivator. About 150 pounds of the same mixture is used per acre. We cultivate only enough to keep the weeds down, and as a rule four cultivations will check them until the corn can shade them out."

When asked about the value of fertilizer, Blaney made this emphatic reply:

"Fertilizing is as much a part of our farming as the plowing and cultivating. This land produces from 25 to 60

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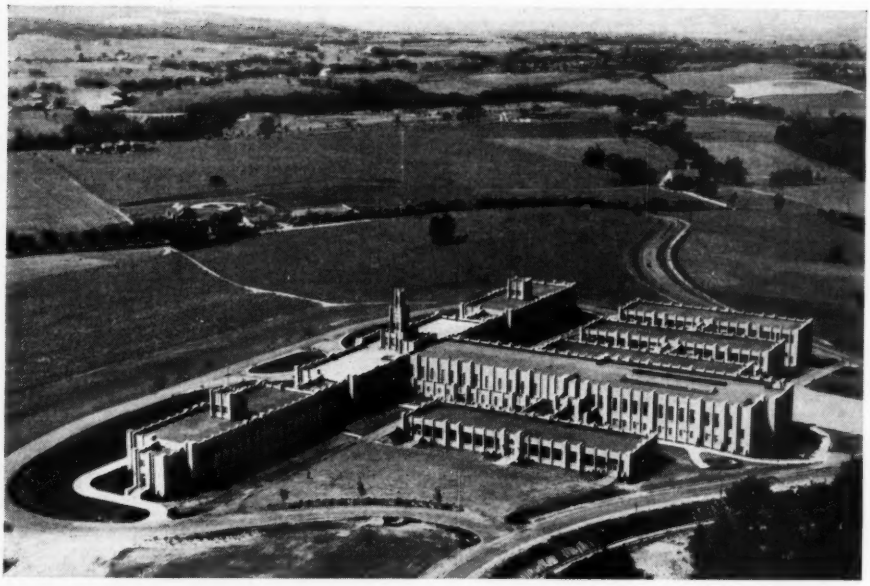
Ed Blaney (right) with a crew of detasselers.



The Hershey Industrial School. In the background is a panorama of some of the Hershey Farms.

Hershey Farms Find Potash Profitable

By B. A. Rockwell

Farm Research Department, Hershey Farms, Hershey, Pennsylvania

THREE years ago the Hershey Industrial School employed an experienced soil chemist. One of his chief duties was to analyze soil samples submitted by the farm research department. In spite of the fact that large amounts of farm manure had been applied to our fields and all crops fertilized with what we believed to be liberal amounts of lime, phosphorus, and potash, more than 90 per cent of our fields were found to be deficient in available potash.

Surprised beyond belief by the report of our chemist, but still not convinced, we started a number of fertilizer experiments involving chiefly the application of varying amounts of potash. In this work we selected alfalfa, potatoes, tomatoes, corn, and mangels because they were the most important crops in our farming system. Results of these field experiments have confirmed the findings of the soil chemist with regard to potash and convinced us of the need for using larger amounts of this valuable plant food.

In presenting the results of our own experiences with potash, it is our sin-

cere hope that farmers in other parts of the country may find in them something of interest, if not a partial solution of some of their fertility problems.

The average yield of potatoes on our farms and on commercial potato farms in Pennsylvania has been generally satisfactory. In normal seasons field averages of 300 bushels or more are quite common, and increasing numbers of farmers are qualifying each year for the "400 Bushel Club." Last year John J. Daniels, Superintendent of the Hershey Industrial School Farm, grew a record yield of 741 bushels. This crop was fertilized with 800 pounds of a 7-21-21 fertilizer and grown under extremely favorable moisture conditions.

Did Potash Prevent Blackening?

High yields, however, are not always associated with quality. The Rural Russet potato, a good yielder and possessed of excellent eating quality, was discontinued at Hershey because of its tendency to turn black after cooking. Having studied the results of Dr. W. E. Tottingham of the University of Wisconsin, where blackening after cooking was associated with potash deficiency regardless of variety, and with blackening of the Russets on our own farms correlated definitely with known potash deficiency as revealed by soil tests, we decided to investigate this problem.

The soil selected for this experiment was a Hagerstown loam. It had a pH of 7.0, adequate supply of calcium and magnesium, an organic content of 1 per cent acre weight, and low content of nitrate nitrogen, phosphorus, and potash. Except for the phosphorus and potash levels, it was fairly ideal for potatoes.

After early spring plowing and thorough preparation of the seedbed, the field was planted to Rural Russets on May 6, 1937, the Iron Age planter being used. The area was divided into four plots, each plot having five 200-foot rows. Plot 1 received 450 pounds per acre of 7-21-0 mixture and plots 2, 3, and 4, respectively, 7-21-7, 7-21-14, and 7-21-21 mixtures at the same rate of application.

When the potatoes were just cracking the ground, the entire area was divided into three sections at right angles to the rows. Section 1 was left as originally fertilized and served as a check. Sections 2 and 3 received broadcast applications of 200 and 400 pounds of 50 per cent muriate of potash, respectively, and harrowed in lightly. Thus by this arrangement 12 variations in potash were made possible, ranging from 0 to the equivalent of 588 pounds per acre of muriate of potash. The yields recorded in the table following are the averages for four rows from each fertilizer treatment, in terms of bushels per acre.

The results show that increasing the potash content in a fertilizer at planting time increased the yield, the highest yield of marketable potatoes in this series being produced by the 7-21-21 analysis. Omitting potash at planting time and adding it only as a top-dress-

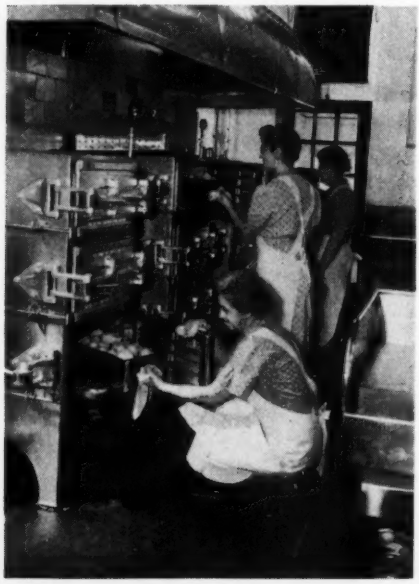
John Daniels (right) discusses his use of a 7-21-21 fertilizer on this potato field which yielded 741 bu. per acre—Pennsylvania's all-time Champion Acre.

Plot	Treatment	US #1	US #2	Culls	Total
1	7–21–0	201.4	42.18	5.40	248.98
2	7–21–7	220.4	23.13	9.52	253.05
3	7–21–14	201.4	36.74	4.08	242.22
4	7–21–21	236.78	44.90	5.40	287.08
5	7–21–0 plus 200 KCl	205.48	42.18	4.08	251.74
6	7–21–7 plus 200 KCl	247.6	34.02	4.08	285.70
7	7–21–14 plus 200 KCl	250.3	34.02	1.36	285.68
8	7–21–21 plus 200 KCl	193.2	34.02	4.08	231.30
9	7–21–0 plus 400 KCl	195.9	36.74	6.80	239.44
10	7–21–7 plus 400 KCl	284.41	31.29	2.70	318.40
11	7–21–14 plus 400 KCl	277.6	34.02	3.4	315.02
12	7–21–21 plus 400 KCl	234.0	34.02	4.08	272.10

NOTE: Fertilizer applied at rate of 450 pounds per acre. The extra potash 200 and 400 pounds per acre broadcast at time of emergence.

ing does not seem to give as good results as if part or all of the potash is applied at planting time on this particular soil.

Highest yields in this experiment were produced by 7-21-7 at planting time, plus a top-dressing of 400 pounds of muriate of potash. Comparing the yields of 318 bushels produced by this treatment with 287 bushels produced by 7-21-21 shows that the split application produced 31 bushels more potatoes, which would be more than enough to pay for the extra potash used. Of even greater significance is the fact that the split application produced more No. 1 potatoes than when all the potash was applied at planting time.



Culinary experts test the cooking quality of potatoes at the Hershey School.

Results of Test

Interpreting these results broadly, it would appear that under average soil conditions, especially where there has been a tendency to excessive vine growth, a 1:3:3 ratio merits serious consideration. And further, under conditions where the supply of organic nitrogen is adequate and the potash level of the soil below normal, potash in addition to that supplied in the basic mixture may best be supplied as a top-dressing at time of emergence.

In the spring of 1938 cooking tests were conducted at the Hershey Industrial School with potatoes grown the previous year on the potash plots. After being cooked under the supervision of culinary experts at the central kitchen,

Potatoes on the left received 15 tons of manure per acre and 500 lb. of a 7-21-21 fertilizer. Those on the right got 15 tons of manure per acre but no fertilizer.

the potatoes were rated by two of the most experienced of these experts with results as follows:

No.	Treatment	Placed by	
		1st Expert	*2nd Expert*
1	7–21–0	6	6
2	7–21–7	5	4
3	7–21–14	4	5
4	7–21–21	1	1
5	7–21–21 (200 KCl)	2	3
6	7–21–21 (400 KCl)	3	2

It is interesting to note that the experts were in agreement with regard to the best and poorest cooking quality, the 7-21-21 ranking first and 7-21-0 last. The rating of the other samples, while not in perfect agreement, were never more than one place apart.

The potatoes from the no-potash plots were poorest in quality, being quite soggy, and turned black after cooking. Improvement in mealiness, flavor, and decrease in tendency to blacken after cooking were closely correlated with the amount of potash used in growing the crop.

On the evidence obtained from our experimental plots at Hershey during 1937 and 1938 and the carefully conducted cooking tests above-mentioned, we are reasonably certain that high yields as well as the most desirable quality characteristics of potatoes depend upon proper nutrition.

During 1938 we set aside three plots of Rural Russets to study the effect of borax. The plots were fertilized with a 7-21-21 fertilizer at the rate of 450 pounds per acre. One plot received 10 pounds of borax per acre and the other none. Throughout the season the borax plot showed greater vigor, stood up better under droughty conditions, and at harvest gave 26.6 more bushels per acre.

Nitrogen-Potash Ratio

For our soils and in our rotation which normally tends to a slight excess of nitrogen, our chief problem is to maintain a fairly definite ratio between nitrogen and potash. The 7-21-21 analysis at the rate of 450 pounds per acre, or other analyses supplying the same amount of plant food in the same ratio, appears to meet our minimum requirements. In addition we are convinced that profitable results may be expected if enough borax is mixed with the fertilizer so as to supply up to but not more than 10 pounds per acre.

In a test on Pritchard tomatoes, one of our very important crops, an experiment to determine the influence of potash on yield and quality was conducted. The treatments and relative yields are given in the table below.

Kind of Fertilizer	Rate of Application	Potash per A.	Yield per 435-ft. Row to August 25	Per cent Increase over Check
none	.....	0	181.6 lb.	.....
3–12–6	500 lb./A.	30 lb.	203.1 lb.	11.2%
3–12–9	500 lb./A.	45 lb.	244.6 lb.	34.7%
7–21–21	300 lb./A.	63 lb.	284.2 lb.	56.5%

These results show that the yields were uniformly increased as the potash content of the fertilizer was increased. Although the nitrogen application was not strictly comparable in all of the plots, it was close enough to warrant the conclusion that potash had a very favorable effect on yield.

From our own rather critical examination of the growing crop and the yield data, we are satisfied that the yield as well as the quality of the fruit on the 7-21-21 plot was superior to the other treatments. In the light of these results, we have revamped our whole program on tomato fertilization. It is our plan to continue our studies on tomatoes with larger amounts of plant food, wider nitrogen-potash ratios, and different times of application. This latter phase has been prompted by the excellent research of Dr. J. B. Hester of the Campbell Soup Company, which has shown phenomenal increases in yield and quality by applying the phosphorus broadcast before planting, a small amount of nitrogen and potash in the transplanting water, and the major part of the nitrogen and potash at intervals up to blooming time.

On the average Pennsylvania farm, corn is the backbone of the highly developed livestock industry. It is at present the most important ensilage crop, although legume and grass silage are making progress in some parts of the State.

In spite of the rather general use of farm manures in the growing of corn,

(*Turn to page* 40)

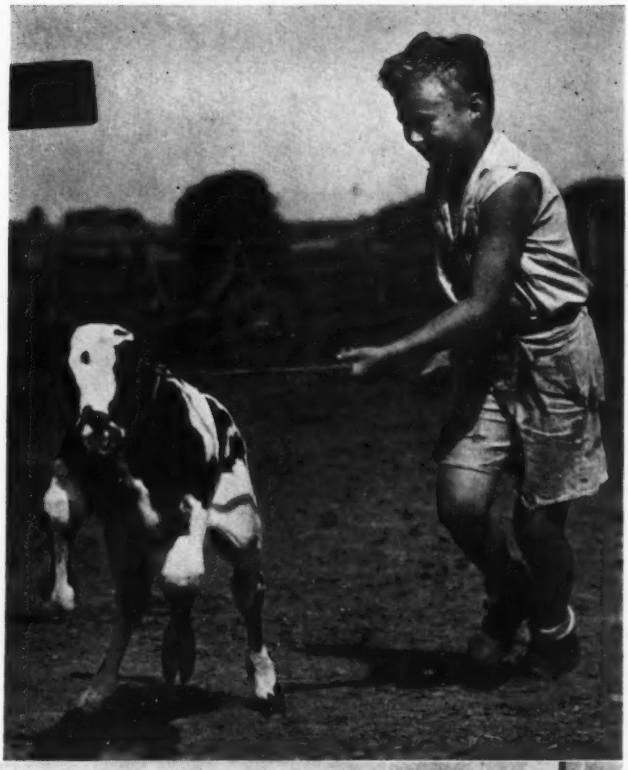
In this wheat field, fertilizer was not applied to one drill width. On either side an 0-10-10 fertilizer was applied at the rate of 300 lb. per acre.

PICTORIAL

A May Queen and one of her young pets.

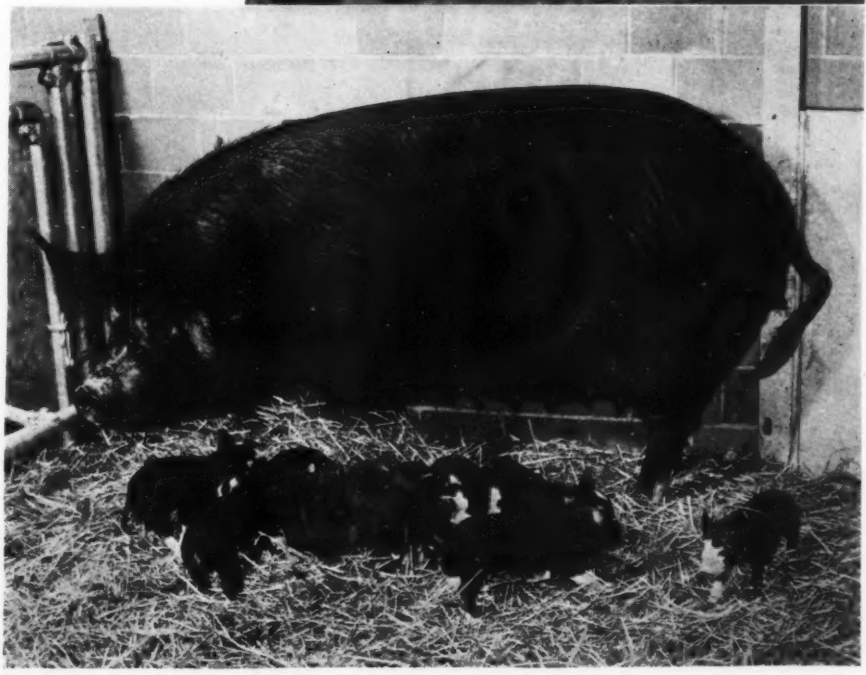
Above: Pickaback.

Left: Show material.



Right: Rarin' to go.

Below: Twin quints



Above: Land is well utilized on this farm near Mobile, Alabama, where potatoes are planted as an intercrop in a pecan orchard.

Below: This early April picking of wax beans on the east shore of Lake Istokpoga, Highlands County, Florida, helped satisfy northern diets.

The Editors Talk

A "Pick-me-up" for Plants

Recently considerable publicity was given to an article by C. B. Sayre, Chief in Research, Vegetable Crops, New York State Agricultural Experiment Station, which appeared in *Farm Research,* Vol. V, No. 2, April 1939 and was entitled "One and A Half Tons of Tomatoes from Fertilizer Costing 48 Cents." Quoting from the article, "It seems surprising that such small quantities of nutrient materials used in a field already well fertilized would make such a striking increase in the yields of tomatoes. The most probable explanation is that this 'starter' solution was applied in a particularly available form just at a critical time in the growth of the plants."

What may develop into new and very important methods of fertilizer application is the indication that plants need pick-me-ups. In the case above, where the solution consisted of plant-food elements dissolved in water and applied at the time the plants were transplanted to the field, the author explains that at transplanting the plants are low in minerals and shorn of most of their root system. Consequently, the application of a correctly balanced, readily available nutrient solution revives and stimulates the plant, thus enabling it to withstand better the shock of transplanting and to become established quickly and grow vigorously from the time it is transplanted. It is emphasized that this nutrient "starter" solution is only a supplementary treatment to be used in transplanting tomatoes and is not recommended as the sole fertilizer application. To carry the vines through the season to produce a heavy yield of tomatoes requires liberal application of fertilizer to the field.

Undoubtedly we shall hear much more of nutrient solutions, which enable the plant to get plant food before the soil can fix it.

Split application of fertilizer materials has long been common in Europe. It is believed the application of nitrogen, phosphates, and potash materials separately and usually at different times may become a practice in this country where because of ease of application, mixed fertilizer is commonly used, although nitrogen and nitrogen-potash top-dressers are popular. Recently some work has been done whereby the phosphates are being applied near the roots and the nitrogen and potash farther away and at different times. In this way some fertilizer materials can be applied in larger amounts with safety, thereby producing bigger yields and higher quality. There are many instances, it is believed, where failure to get profitable results from larger amounts of fertilizer has been due to improper placement and burning effect rather than to the crop's lack of actual need for and ability to utilize more plant food. With burning injury eliminated by method of application, it remains to be seen what yields and quality will ultimately be produced.

The whole question of greater efficiency of fertilizer through time and method

of application is challenging more intensive research and experimental work. Much has been accomplished by the work of the National Joint Committee on Fertilizer Application, which is dividing its future work into two major activities, the first, extension of knowledge already gained; the second, still further exploring possibilities through research fields. Machines are now being developed, and some already are on the market, which will place fertilizer very accurately in the soil with respect to seed or plant. Others will simultaneously place the different nutrients in different positions, while still others carry tanks for applying nutrient solutions. As one surveys the field of plant nutrition, it is evident that despite the great amount of work already done, the problems yet to be approached are many and are becoming increasingly important.

Extension Takes Stock of Itself

It is good for everyone to periodically take stock of himself. This month there is occurring a very intensive stock-taking of one of the most influential groups in American agriculture—the Agricultural Extension Force. The occasion which prompted this review of accomplishments, present work, and opportunities for service in the future is the 25th Anniversary of the signing of the Smith-Lever Act which created nation-wide cooperative extension work of the Department of Agriculture and Land-Grant Colleges.

Meetings celebrating the anniversary are being held in every State in the Union and in many States in every county. Among the most noteworthy of the meetings planned was that on the Porter farm near Terrell, Texas, where the demonstration method of teaching farm people the most approved practices on their own or neighboring farms was put into effect more than 35 years ago. Some of the early history of the Service is given in Mr. Cooper's article appearing on page 13 of this issue.

From this modest beginning, the Extension system has grown until now agents are employed in 2,953 of the nation's 3,079 counties. They conducted 767,000 demonstrations of better farming and homemaking practices last year, and were constant advisers to farm people on such problems as the outlook for agricultural products, cooperative marketing, well-balanced meals, and countless other farm and home problems.

Much of the early Extension work was directed toward increasing crop yields, in which fertilizer demonstrations played an important part. During the last few years a large part of the agents' time has been spent in explaining national farm programs and in working with farm people on such problems as crop adjustment, soil conservation, farm security, and sound land-use. However, crop production and especially the production of better quality crops are, and should be, still recognized as major problems. It is in the wealth of our soils that the permanence of our agriculture and agricultural systems will endure.

We herewith extend our congratulations to the Extension Force for its 25 years of outstanding achievement. Fully cognizant of what it has meant to the agricultural advancement of this country, we offer our best wishes for as great a showing on its 50th Anniversary.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

¶ A concise little handbook on fertilizer use is "Recommendations of the Provincial Fertilizer Board for 1939" being distributed by the Publicity Service of the Department of Agriculture, Quebec. While it is pointed out that these are only general recommendations and that in following them it is advisable in individual cases to consider also the special existing soil and climatic conditions of the farm, the pamphlet is a good guide to the rational use of fertilizers. Canadian Provincial Fertilizer Boards are made up of representatives of the experimental research groups and members of the regulatory services, with facilities provided for the fertilizer industry to present its views.

"Phosphate Investigations in Montana 1938," Agr. Exp. Sta., Bozeman, Mont., Bul. 369, Feb. 1939, W. P. Willis, Jr., and F. M. Harrington.

"Fertilizer Recommendations for New York," Cornell Univ. Agr. Ext. Serv., Ithaca, N. Y., Bul. 281, April 1934 (Revised Feb. 1939).

"Progress Report on Fertility Investigations with Peanuts in 1938," Agr. Exp. Sta., Raleigh, North Carolina, Agron. Inf. Cir. 117, March 1939, E. R. Collins and H. D. Morris.

Soils

¶ Speculation as to the effects of various methods of management, long continued, on the physical properties of the soils and on their organic matter and nitrogen content prompted N. J. Shaulis and F. G. Merkle to sample and analyze the soils of representative commercial orchards and vineyards of Pennsylvania. Their findings are reported in Pennsylvania Agr. Exp. Sta. Bulletin 373, "Orchard Soil Management, Some Effects of Different Practices on the Soil." Various systems of soil management brought about measurable differences in carbon, nitrogen, and volume weight of these soils. The depth of topsoil likewise was affected by the method of soil management. Sod management was found superior as far as soil fertility is concerned to either clean-cultivation or the use of annual cover crops. The use of non-leguminous cover crops will not maintain the total nitrogen, organic carbon, or volume weight of soil as found under forest conditions. A leguminous cover crop, as used at Pennsylvania State College, will satisfactorily maintain an orchard soil. A sod-forming type of cover, either permanent or occasionally torn up, is the most satisfactory practice commonly used for maintaining the fundamental soil qualities which lead to permanent productivity. The bulletin cites considerable literature, thereby comprising a rather complete study on this phase of orchard management.

"Terracing and Related Soil Conservation Practices for Alabama," Agr. Ext. Serv., Auburn, Ala., Cir. 165, Nov. 1938, J. B. Wilson and R. E. Yoder.

"Hilgardia," Agr. Exp. Sta., Berkeley, Calif., Vol. 12, No. 3, Jan. 1939.

"Soil Testing in Connecticut," Agr. Exp. Sta., New Haven, Conn., Cir. 131, Mar. 1939, M. F. Morgan, T. R. Swanback, and J. S. Owens.

"Panhandle Bulletin," Panhandle Agr. Exp. Sta., Goodwell, Okla., No. 64, April 1939.

"Principles of Gully Erosion in the Piedmont of South Carolina," U. S. D. A., Washington, D. C., Tech. Bul. 633, Jan. 1939, H. A. Ireland, C. F. S. Sharpe, and D. H. Eargle.

"The Land in Flood Control," U. S. D. A., Washington, D. C., Misc. Pub. 331, 1938.

"Erosion and Related Land Use Conditions on the Reedy Fork Demonstration Area, North Carolina," U. S. D. A., Washington, D. C., 1938, W. W. Stevens, H. V. Bragg, E. C. Sease, and O. C. Lewis.

"Soil Survey, Athens County, Ohio," U. S. D. A., Washington, D. C., Series 1932, No. 32, Nov. 1938, A. H. Paschall, J. G. Steele, F. G. Loughry, and G. W. Conrey.

"Problem-Area Groups of Land in the Southern Great Plains," U. S. D. A., Washington, D. C., Feb. 1939, H. H. Finnell.

"Land Facts on the Southern Plains," U. S. D. A., Washington, D. C., Misc. Pub. 334, 1939, Glenn K. Rule.

Crops

¶ Reflecting the rapidly growing interest in hybrid corn, five publications in recent circulation are notable. These include: "Illinois Corn Performance Tests—1938" by G. H. Dungan, A. L. Lang, J. H. Bigger, Benjamin Koehler, and Oren Bolin, Ill. Agr. Exp. Sta. Bulletin 450; "Hybrid Corn Trials in 1938" by R. G. Rothgeb and A. D. Hoadley, Maryland Agr. Exp. Sta. Misc. Pub. 671; "Field Corn in Massachusetts" by W. G. Colby and R. W. Donaldson, Mass. Agr. Exp. Sta. Bul. 356; "Minnesota Hybrid Corn, Field Trials, 1938" by Ralph F. Crim, Minn. Agr. Ext. Div. Ext. Pamphlet 57; and "Hybrid Corn in Wisconsin" by A. H. Wright, N. P. Neal, and E. J. Delwiche, Wis. Ext. Serv. Cir. 291. Of importance to growers in the respective States, these publications, as their titles imply, record the results of trials to find best adapted strains as well as the cultural methods necessary to get the most out of hybrids. Sound and practical advice is to be found in these recordings, advice which will aid materially the growers interested in this new phase of corn production.

¶ For the man who likes to get out in the spring with a rake and a hoe, two States have revised and brought up to date their publications on vegetable gardening. Pennsylvania State College's Circular 120, "The Family Vegetable Garden," by W. B. Nissley and J. M. Huffington is a veritable encyclopedia of vegetable gardening lore, inclusive enough for the beginner and yet containing much helpful information for the more experienced. The same may be said of Minnesota's well-illustrated "Vegetable Gardening," Extension Bul. 174 by A. E. Hutchins. Many of the practices advocated are applicable to good gardening anywhere.

"Forty-eighth Annual Report, January 1, to December 31, 1937, of the Agricultural Experiment Station of the Alabama Polytechnic Institute," Agr. Exp. Sta., Auburn, Ala., M. J. Funchess, Dir.

"Annual Report of Extension Work for the Year 1938," Agr. Ext. Serv., Little Rock, Ark., Cir. 418, Dec. 1938.

"Tobacco Substation at Windsor Report for 1938," Agr. Exp. Sta., New Haven, Conn., Bul. 422, Mar. 1939, P. J. Anderson, T. R. Swanback, and O. E. Street.

"Lettuce, Iceberg Type," Agr. Ext. Serv., Storrs, Conn., Bul. 268, Nov. 1938, Albert E. Wilkinson.

"Golden Anniversary, Fiftieth Annual Report, of the University System of Georgia for the Year 1937-38," Agr. Exp. Sta., Experiment, Ga., H. P. Stuckey, Dir.

"Research at the College of Agriculture, the University of Georgia, for the Fiscal Year Ending June 30, 1938," Univ. of Ga., Athens, Ga., Vol. XXXVIII, No. 10, Serial No. 708, June 1938.

"University System of Georgia, Eighteenth Annual Report 1937-1938," Ga. Coastal Plain Exp. Sta., Tifton, Ga., Bul. 29, July 1938.

"Problems in Growing Tomatoes in Illinois," Agr. Ext. Serv., Urbana, Ill., Cir. 491, Jan. 1939, W. A. Huelsen.

"Report on Agricultural Research for the Year Ending June 30, 1938, Part 1, Project Reports, Publications, Staff, Financial Statement," Agr. Exp. Sta., Ames, Iowa.

"Crimson Clover and Other Winter Legumes," Agr. Ext. Serv., Lexington, Ky., Sept. 1938, Cir. 318, E. N. Fergus, Ralph Kenney, and W. C. Johnstone.

"Kentucky Fruit Notes," Vol. 1, No. 8, April 1939, Agr. Exp. Sta., Lexington, Ky.

"Maine Fruit Notes," Agr. Ext. Serv., Orono, Maine, Vol. 13, No. 1, March 1939.

"Legume and Grass Silage, A Survey of Methods and Results on 380 Northeastern Farms," Agr. Exp. Sta., College Park, Md., Sp. Bul. 411, April 1938.

"Blueberry Culture in Massachusetts," Agr. Exp. Sta., Amherst, Mass., Bul. 358, Feb. 1939, John S. Bailey, Henry J. Franklin, and Joseph L. Kelley.

"Fruit Notes," Agr. Ext. Serv., Amherst, Mass., Mimeo., March 1939, W. H. Thies.

"The Massachusetts Commercial Vegetable Grower," Agr. Ext. Serv., Amherst, Mass., No. 17, March 1939.

"The Relative Importance of Various Factors Influencing Profits in Strawberry Production," Agr. Exp. Sta., East Lansing, Mich., Tech. Bul. 162, Feb. 1939, Neal D. Peacock.

"Studies on Some Factors Relating to Hardiness in the Strawberry," Agr. Exp. Sta., St. Paul, Minn., Tech. Bul. 135, Feb. 1939, Ernest Angelo, V. E. Iverson, W. G. Brierley, and R. H. Landon.

"Fifty-first Annual Report, 1938, New York State College of Agriculture at Cornell University," Cornell Univ., Agr. Exp. Sta., Ithaca, N. Y., 1939.

"Seedstalk and Bulb Development in the Onion (Allium cepa L.)," Cornell Univ. Agr. Exp. Sta., Ithaca, N. Y. Bul. 708, Nov. 1938, H. C. Thompson and Ora Smith.

"State Reforestation in Two New York Counties, the Story of the Land and the People," Cornell Univ. Agr. Exp. Sta., Ithaca, N. Y., Bul. 712, Feb. 1939, T. E. LaMont.

"Farm Research," Agr. Exp. Sta., Geneva, N. Y., Vol. V, No. 2, April 1, 1939.

"Wheat, Its Milling and Baking Quality," Agr. Exp. Sta., Fargo, N. D., Cir. 62, Sept. 1938, Rae H. Harris.

"Grasses and Legumes for Pasture and Hay," Agr. Exp. Sta., Fargo, N. D., Cir. 64, March 1939, Warren Whitman, T. E. Stoa, and Herbert C. Hanson.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XXIV, No. 197, March-April 1939.

"A Better Rural Life, Twenty-fifth Annual Report," Agr. Ext. Serv., Stillwater, Okla., Cir. 365, Ernest E. Scholl, Dir.

"A Preliminary Study of the Larger Aquatic Plants of Oklahoma with Special Reference to Their Value in Fish Culture," Agr. Exp. Sta., Stillwater, Okla., Tech. Bul. 4, Oct. 1938, James H. B. deGruchy.

"Ladino Clover for Western Oregon," Agr. Exp. Sta., Corvallis, Oreg., Sta. Cir. 129, Nov. 1938, H. A. Schoth.

"Pruning Suggestions for Fruit Trees," Agr. Ext. Serv., Corvallis, Oreg., Ext. Cir. 320, Dec. 14, 1938, O. T. McWhorter.

"Department of Agriculture of Oregon Bulletin," St. Dept. of Agr., Salem, Oreg., No. 87, March 1939.

"Asparagus and Rhubarb," Agr. Ext. Serv., State College, Pa., Leaf. 32, April 1938, W. B. Nissley.

"Kudzu in South Carolina, Its Value for Forage, Grazing, and Soil Improvement," Agr. Ext. Serv., Clemson, S. C., Cir. 164, Dec. 1938.

"Essentials of Cotton Production, Practical Suggestions from Five Thousand Five-acre Cotton Contest Records," Agr. Ext. Serv., Clemson, S. C., Cir. 169, March 1939, B. E. G. Prichard.

"Preparing and Planting Tobacco Plantbeds," Agr. Ext. Serv., Clemson, S. C., Inform. Card 51, Dec. 1938, H. A. McGee.

"Annual Report of the South Dakota Agricultural Experiment Station for the Fiscal Year Ending June 30, 1938," Agr. Exp. Sta., Brookings, S. Dak.

"Blue Mold (Downy Mildew) of Tobacco and Its Control," Agr. Ext. Serv., Knoxville, Tenn., Pub. 221, March 1939.

"Olive Growing in the Southwestern United States," U. S. D. A., Washington, D. C., Farmers' Bul. 1249, C. F. Kinman.

"Blue Mold (Downy Mildew) Disease of Tobacco," U. S. D. A., Washington, D. C., Farmers' Bul. 1799, Revised Jan. 1939, E. E. Clayton, John G. Gaines, Thomas E. Smith, Kendall J. Shaw, and W. M. Lunn.

"Hard Red Winter Wheat Varieties," U. S. D. A., Washington, D. C., Farmers' Bul. 1806, Dec. 1938, K. S. Quisenberry and J. Allen Clark.

"Time of Irrigating Potatoes as Affecting Stolon Growth and Tuber Set and Development," U. S. D. A., Washington, D. C., Cir. 496, Dec. 1938, W. C. Edmundson.

"Composition of the Rhizome, Stem, and Leaf of Some Horticultural Forms of Canna in Relation to Their Possible Use," U. S. D. A., Washington, D. C., Cir. 497, Nov. 1938, C. W. Culpepper and H. H. Moon.

"The Sebago Potato, A New Variety Resistant to Late Blight," U. S. D. A., Washington, D. C., Cir. 503, Nov. 1938, F. J. Stevenson and C. F. Clark.

"The Chemical Determination of Soundness in Corn," U. S. D. A., Washington, D. C., Tech. Bul. 644, Jan. 1939, Lawrence Zeleny and D. A. Coleman.

"Field Studies of Certain Diseases of Snap Beans in the Southeast," U. S. D. A., Washington, D. C., Tech. Bul. 647, Dec. 1938, W. D. Moore.

"Dormancy in Lettuce Seed and Some Factors Influencing Its Germination," U. S. D. A., Washington, D. C., Tech. Bul. 655, Dec. 1938, Ross C. Thompson.

"Descriptions of Types of Principal American Varieties of Spinach," U. S. D. A., Washington, D. C., Misc. Pub. 316, Oct. 1938, Roy Magruder, Victor R. Boswell, G. W. Scott, Paul Work, and Leslie R. Hawthorn.

Economics

¶ Since the beginning of the depression, interest in the reorganization of American agriculture has been considerably intensified. In the South much has been said about the so-called one-crop system and the advantages of greater diversification. Recently the Extension Service of the Alabama Polytechnic Institute has published an analysis of Alabama's agriculture from the standpoint of its deficiencies, its needs, and its opportunities. The publication, Extension Circular 164, is entitled,

"Agriculture in Alabama" and is written by F. W. Gist. In his opening paragraph, the author sets forth very clearly what, in the final analysis, the object of agriculture should be: "The chief end of any system of farming is to produce an income that is adequate for a desirable standard of living and, at the same time, of such permanent nature as to leave the farm capable of so producing in the future. That income may be products consumed on the farm or it may be cash from products produced and sold." It is the opinion of the author that the practice of following an exhaustive type of agriculture has caused a large part of the low average income in the State at the present time. In the early part of the circular, he takes up the disadvantages of the one-crop type of farming and points out what the system ultimately leads to, such as overproduction, lack of distribution of labor, and a large cash outlay for the necessities of life.

Considerable attention is given to the advantages of producing on the farm as many of the necessities of life as is practicable, such as meat, vegetables, etc. It is pointed out that among all the successful farmers in the nation and in the State, there will be found none who do not follow the practice of producing a large part of the products necessary for home consumption.

An analysis for the census record for the years 1929-35 discloses that due to the marked decrease in the unit prices, the income per capita from crops was much less in 1935 than in 1929, but income from livestock products was only slightly different in the 2 years. From this it is concluded that had the proportion of income from livestock products been greater, the farmers in Alabama would have been much better able to withstand the depression.

The next step in the analysis was to compare 8 States of comparatively high per capita income with 8 States of comparatively low per capita income, in an attempt to determine the fundamentals underlying the difference. It was found that in the States with higher per capita income there were considerably more acres per capita, that the per cent of total income from livestock was much higher on the high income farms, and that a much higher percentage of the crops produced were fed to livestock. Another advantage of the higher income States was the higher average yield of most of the feed crops, especially corn, averaging 31.5 bushels as compared to 17.3 in the low income Southern States.

Since yield is an important factor in the cost of production of cotton, it was felt that the change to a more diversified type of farming which would result in higher yields per acre would also result in lower cost per unit of cotton. It was found, in analyzing the census report for Alabama, that many farms did not report milk cows, in fact in some counties as high as 34%, and in some counties as high as 95% of the farms reported no brood sows. Points to be followed in order to produce a higher standard of living on farms in Alabama include production of a large part of the food consumed at home, reduction of costs, redistribution of labor, home production of feed, and increasing yields, conservation of resources by crop rotation, quality production, reducing credit costs, prevention of soil erosion, and last, redistribution of crop acreage in Alabama to provide a greater diversification of income.

¶ According to the report, "Maryland Fertilizer Facts for 1938," published by the Inspection and Regulatory Service at College Park, Maryland, total fertilizer sales in that State in 1938 amounted to 166,408 tons. Of this total 129,679 tons were complete fertilizers, and 13,402 tons were superphosphate and potash mixture. The balance included 1,282 tons of nitrogen salts, 12,496 tons of superphosphate, and 1,141 tons of potash salts.

In 1938 there were 98 firms registered, with 918 different brands, 97 analyses, 76 complete fertilizers, and 11 superphosphate and potash mixtures.

There were contained in the 1938 tonnage of mixed fertilizers 4,266 tons

of nitrogen, 11,826 tons of phosphoric acid, and 8,859 tons of potash. Although tobacco is one of the important cash crops in southern Maryland, only 12,147 tons of the tobacco grades were sold. The leading tobacco grade in 1938 was 4-8-12 representing 5,295 tons; 4-8-10 and 4-8-7 were also important.

The five leading analyses in mixed fertilizers in 1938 in order of their importance were: 2-9-5, 6-6-5, 2-12-6, 2-8-10, and 4-8-7. The 15 leading analyses represented the bulk of the fertilizers sold, about 139,409 tons. The tonnage of the Maryland standard analysis fertilizers as recommended for 1938 amounted to 68,722 tons. Heading this list in order of importance are 6-6-5, 2-12-6, 2-8-10.

"The Economic Analist," Ottawa Dept. of Agr., Ontario, Canada, Vol. IX, No. 2, April 1939.

"Connecticut Vegetable Industry and Its Outlook for 1939," Dept. of Agr., Hartford, Conn., Bul. 59, April 1939.

"Economic Digest," Agr. Ext. Serv., Storrs, Conn., Nos. 74 & 75, Jan. & Mar. 1939.

"Consumption of Fertilizer Materials by Counties of Florida for Month of February, 1939 as Reported by Manufacturers," Fer. Statis. Div., Bur. of Inspec., Tallahassee, Fla., Nathan Mayo, Com.

"1939 Agricultural Outlook for Georgia," Agr. Ext. Serv., Athens, Ga., Bul. 468, Dec. 1938.

"Summary of Shipments of Fruit and Vegetables from Hawaii to the Mainland, 1931-1938," Agr. Ext. Serv., Honolulu, T. H., Ext. Cir. 3, Mar. 1939, Kenneth I. Hanson and Kenichi Murata.

"Annual Summary of Fruit and Vegetable Unloads in Honolulu 1938," Agr. Ext. Serv., Honolulu, T. H., Ext. Cir. 4, Mar. 1939, Kenneth I. Hanson and Kenichi Murata.

"Capacity to Pay and Farm Financing," Agr. Exp. Sta., Urbana, Ill., Bul. 449, Dec. 1938, L. J. Norton, Joseph Ackerman, and C. R. Sayre.

"Illinois Farm Economics," Agr. Ext. Serv., Urbana, Ill., No. 46, Mar. 1939.

"Report of Analysis of Commercial Fertilizers," Dept. of Agr., Baton Rouge, La., Fer. Rpt. Season 1937-1938, Harry D. Wilson, Com.

"Official Inspections 169," Agr. Exp. Sta., Orono, Maine, Oct. 1938.

"Inspection of Agricultural Lime Products," Agr. Exp. Sta., Amherst, Mass., Control Series Bul. 97, Dec. 1938, H. D. Haskins.

"Farm Economic Facts," Agr. Ext. Serv., Amherst, Mass., Vol. XII, Nos. 2 & 3, Feb. & Mar. 1939.

"Crop Report for Michigan, March 1939," Dept. of Agr., Lansing, Mich.

"Marketing Michigan Vegetable Crops," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 169, Mar. 1939, H. P. Gaston.

"Report of Analyses of Commercial Fertilizers and Fertilizer Materials Years 1934-1938," St. Dept. of Agr., State College, Miss., J. C. Holton, Com.

"New Systems on Northwest Missouri Upland Farms," Agr. Ext. Serv., Columbia, Mo., Cir. 391, Nov. 1938, D. B. Ibach and H. B. Steele.

"Inspection of Commercial Fertilizers for 1938," Agr. Exp. Sta., Durham, N. H., Bul. 311, Nov. 1938, T. O. Smith and H. A. Davis.

"Ninth Annual Report of the New Mexico Feed and Fertilizer Control Office, Year Ending Dec. 31, 1938, Commercial Fertilizers," Feed and Fer. Control Office, State College, New Mex., Feb. 15, 1939, R. W. Ludwick and Lewis T. Elliott.

"The Peach Enterprise in Western New York, Soil Relationships, Costs and Returns, and Marketing," Cornell Univ., Agr. Exp. Sta., Ithaca, N. Y., Bul. 710, Jan. 1939, Herrell F. DeGraff.

"An Economic Study of Land Utilization in Wyoming County, New York," Cornell Univ., Agr. Exp. Sta., Ithaca, N. Y., Bul. 707, Nov. 1938, H. R. King.

"Fertilizer Tonnage, New York for the 1938 Calendar Year," Agr. Ext. Serv., Ithaca, N. Y., Mimeo. 492, Feb. 15, 1939.

"Farm Economics," Cornell Univ. Agr. Ext. Serv., Ithaca, N. Y., No. 112, April 1939.

"Spring and Fall 1938 Analyses of Commercial Fertilizers," Dept. of Agr., Raleigh, N. C., Vol. II, No. 1, Mar. 1939.

"Compiled Agricultural Statistics of North Dakota and Reports of Dairy Department, Labor Department, Minimum Wage Department, Division of Brands, for the Periods From July 1, 1936 to June 30, 1938," Dept. of Agr., Bismarck, N. Dak., John N. Hagan, Com.

"Timely Economic Information for Ohio Farmers," Agr. Ext. Serv., Columbus, Ohio, No. 131, Nov. 1938.

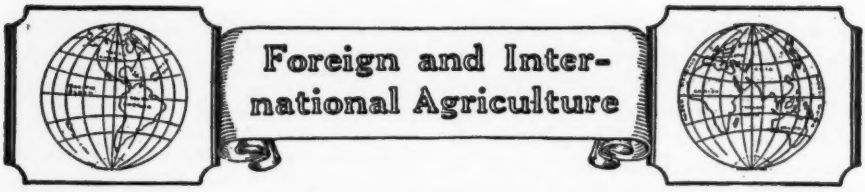
"North Dakota Farm Outlook—1939," Agr. Ext. Serv., Fargo, N. Dak., Cir. 165, Dec. 1938, Harry G. Anderson.

"Production and Income Statistics for Certain Specialty Farm Products Oregon—1937," Agr. Ext. Serv., Corvallis, Oreg., Ext. Cir. 319, Dec. 1938, M. D. Thomas, L. R. Breithaupt, and C. J. Borum.

"An Economic Study of Farming in the Crooked Creek Area, Indiana and Armstrong Counties, Pennsylvania," Agr. Exp. Sta., State College, Pa., Bul. 369, Nov. 1938, David H. Walter.

"The Agricultural Outlook South Carolina, 1939," Agr. Ext. Serv., Clemson, S. C., Cir. 165, Jan. 1939, O. M. Clark and E. H. Rawl.

"Commercial Fertilizers—1939," Dept. of Agr. and Markets, Madison, Wis., Bul. 198, Dec. 1938.



To supply information on agricultural research in other countries, titles and a few descriptive remarks of principal articles in the two magazines "Die Ernährung der Pflanze," published in Berlin, Germany, and "La Potasse," published in Mulhouse, France, are given here. Due to space limitation, only articles of general fundamental interest are given, although both magazines contain other articles of local interest and abstracts of outstanding articles in other publications.

Die Ernährung der Pflanze, April 1939, Vol. 35, No. 4

On the Effect of Potassium on Plants Receiving Nitrogen in the Form of Nitrates and of Ammonium Salts. *By W. Schropp and B. Arenz, Weihenstephan, Germany.*

The authors grew a number of different varieties of plants in water or in pots with different levels of potash and in some cases of phosphate fertilization. Nitrogen was added in nitrate and in ammonium form. Each of these treatments was run in duplicate, nitrate nitrogen being added in one case and ammonium in the other. Marked differences in the growth of the plants and in their response to potash fertilization resulted from the use of the two forms of nitrogen. From the work the authors concluded that plants lacking in potash cannot use ammonium nitrogen as well as they can nitrate nitrogen. Plants fertilized with ammonium nitrogen require a higher potash fertilization for a full yield than plants receiving nitrate. Ammonium salts may be toxic or growth-depressing to plants, but this effect can be reduced or eliminated by potassium. Absorption of nitrogen in the ammonium form is favorably influenced by a high ratio of potash compared to nitrogen and phosphoric acid. Nitrates seem to be most efficient when the ratio of the nutrients is about equal. The excretion of ammonia by plants is reduced or prevented by the use of potash when the ratio of potash in the nutrients is high. The potash apparently permits the plants to utilize the nitrogen more efficiently, whereby the ammonia is more quickly synthesized to amid or amino acid forms.

The Economic and Technical Aspects of Investigations Concerning the Influence of Manuring on the Quality of Agricultural Produce. *By M. Ott, Darmstadt, Germany.*

A periodic revival of interest in the influence of fertilizers on the quality of foods and on the health of the population eating the fertilized food has recently occurred. This has raised the question of what factors in quality should be studied. This in turn is dependent on the properties of the various plants and the role they play in nutrition. The author groups plants on the basis of their use into seed plants, such as corn, wheat, pea beans, etc.; root and tuber plants, such as potatoes, kohlrabi, beet, radishes, etc.; green plants, such as lettuce, cabbage, green peas, etc.; fruits, such as tomatoes, apples, cucumbers, etc.; and fungi, including mushrooms and yeasts used as food. The principal role of each of these groups in the nutrition of the population is briefly discussed. To investigate the quality of the plant, those particular properties which are of importance should be examined chemically. This will present many problems which will require the use of the best and most modern methods of research.

The Cultivation of Table Grapes in Belgium. *By Marnefje, La Hulpe, Belgium.*

A remarkable grape-growing industry has developed within the last 75 years in an area surrounding Hoeylaert, near

Brussels. On hills and soils not well adapted to general agricultural production, some 26,000 glass houses produce table grapes for fresh consumption the whole year around. The author briefly describes the organization of the industry and cultural practices. Heavy fertilization for the intensive culture is necessary. Each house with an area of about 180 square yards receives heavy dressings of well-rotted manure and about 44 pounds of sulphate of ammonia, 22 pounds of dicalcium phosphate, and 44 pounds of sulphate of potash.

On the Physical Chemistry of the Soil. *By H. Pallmann, Zürich, Switzerland.*

This is an abstract of a technical lecture on the factors influencing soil structure, with emphasis on colloidal and electrolytic phenomena in soils.

Nutritional Investigations on Coffea Arabica. *By J. C. s'Jacob, Besoeki, Java.*

Characteristic appearances of coffee plants, and particularly of the leaves and roots when grown under conditions of a deficiency of a nutrient are described and illustrated. The effects of an excess of some nutrients also are given. The nutrients considered are nitrogen, phosphorus, potassium, calcium, magnesium, and sulphur. The plants were grown in water culture, and in this abstract the problems encountered in growing the plants in this way are briefly outlined. The author found that boron and iron supplies in the nutrient solutions were of great importance. Coffee apparently has a very high iron requirement. The effects of boron deficiency are given in some detail, together with two photographs showing incipient and marked deficiency.

On the Leaf Scorch Disease of Currants, With Reference to the Origin of Deficiency Chlorosis. *By K. Boresch, Tetschen-Liebwerd, Germany.*

The factors and conditions favoring the development of leaf scorch on currants were investigated by the author. A lack of potash was the principal cause of this phenomenon. Under some conditions where the chlorine in the plant was present in a high ratio compared to the potassium, leaf scorch also developed. The idea is presented that in reality there was no direct chlorine damage, but the chlorine ions attracted calcium or other cations which displaced the potassium ions in the cell particles, and thereby the effects of potash starvation were produced. With a very high salt concentration, especially with sulphates, spotting of the leaves occurred. Reasons for the development of scorching are discussed, and the possibility of a lack of potassium in the tissues interfering with oxygen assimilation or the utilization of light energy is advanced.

La Potasse, March 1939, Vol. 13, No. 119

The Reforestation Syndicates in Basses-Pyrénées. *By A. Douence, France.*

This article describes the activities of two syndicates of a cooperative nature formed to facilitate the reforestation of large areas in Basses-Pyrénées, in the southwest corner of France. This region was once covered with oak and chestnut forests, but diseases of the trees ravaged the section so that today it supports little or no growth. A casual visitor would call the areas "barrens," but the natives call them "touya." Problems to be overcome were numerous. Among them were the sheep herders who were accustomed to allow their herds to run wild over the land. The improvement of pastures by fertilizing and careful management has helped solve this problem. The extent of the reforestation work and methods used are discussed.

Balance the Fertilizer for Sugar Beets. *By H. Richard, France.*

Work from two sections in France and from Belgium is quoted to show the general nutrient needs of beets growing in those sections. In the French areas the nitrogen fertilization should be

about 130 pounds per acre, the phosphoric acid about 120 pounds, and the potash about 170 pounds. In Belgium the most economical amounts were found to be about 80 pounds of nitrogen, 60 pounds of phosphoric acid, and 160 pounds of potash per acre. Analyses on 203 samples of soils in the Belgian beet area showed an average content of available potash on 14 mg per 100 g soil. The theoretical fertilizer needs of the soils were calculated from the chemical tests. Field tests show that the response to nitrogen was very close to the theoretical figure, but that more phosphoric acid and potash were needed to produce most economical yields than were indicated by the tests.

MALTING BARLEY IN CHER. *By H. Souques, P. Mauron, and P. Renard, France.*

The Department of Cher, in central France, grows considerable barley for malting, but the common varieties grown are not entirely suitable. The authors report preliminary trials of seven varieties, with brief remarks concerning their growth. The fertilization employed is of interest as indicating usage in France. The ground for the trials was plowed in the fall and about 150 pounds each of 38% bicalcic phosphate and 49% muriate of potash per acre were applied at the beginning of March. The seed was planted the third week of March and a top-dressing of 150 pounds of calcium nitrate was given in April.

FERTILIZATION OF EARLY POTATOES AND THE IMPORTANCE OF THE METHOD OF APPLYING THE FERTILIZER. *By G. Drouineau, Antibes, France.*

Two methods of applying fertilizers of varying composition were compared on early potatoes in southern France. In one case the fertilizer was broadcast and lightly harrowed in; in the other case, it was disked in to a depth of 10 inches. The soil was a gravelly calcareous clay, low in phosphorus, but considered rather well supplied with replaceable potash. The standard fertilization consisted of about 250 pounds of sulphate of ammonia per acre, 700 pounds of superphosphate, and 250 pounds of muriate of potash. One plot was unfertilized, another received only nitrogen and phosphate, while another received double the regular potash. The fertilizer placed down into the soil produced about one-third more potatoes than the surface application. Omitting the potash from the fertilizer reduced yield below the unfertilized plot. The complete fertilizer not only increased the yield but increased the size of the tubers. The placement of fertilizers for potatoes is discussed in the light of these results, with reference to American work on this subject.

FORAGE CABBAGE ON THE EXPERIMENTAL FIELD AT LION D'ANGERS. *By J. Valentin, France.*

Forage cabbage is an important crop in western France, particularly for dairy cows. The high yields of forage produced make great demands on the nutrient supply of the soil as shown by the following data on nutrient removal by a crop of 36 tons per acre, determined by Garola: nitrogen, 250 pounds; phosphoric acid, 90 pounds; potash, 450 pounds; and lime, 270 pounds. Results of growing the crop on a potash experimental field are given. The entire area received 720 pounds of basic slag per acre, and top-dressings of 270 pounds of sulphate of ammonia and 180 pounds of nitrate of soda. One plot received no potash, another 270 pounds, and a third 540 pounds. The yield on the plot without potash was 9.5 tons per acre; on the plot with low potash, 40.5 tons; and on the plot with high potash, 45 tons. It is stated that much of the yellowing and sickening of the plants in this area which frequently occurs in early fall is really the symptoms of potash starvation showing on the plants.

Campaign Against Erosion Underway All Over Nation

ALTHOUGH "man-made" soil erosion increased year by year in this country as settlers moved west, it was not until 1933 that the problem was attacked on a Nation-wide scale. In that year the Soil Erosion Service, now the Soil Conservation Service, was organized.

During the past 6 years, 175 demonstration areas have been established in 45 States and Puerto Rico, the Service says in a current statement. Erosion control work is going forward under technical supervision of the Service near more than 350 C. C. C. camps. Hundreds of individual farms are being replanned for soil conservation in cooperation with State extension services.

Over the country as a whole the Soil Conservation Service demonstration program includes cooperative agreements with nearly 70,000 landholders and covers more than 12 million acres of privately owned land. The Service is also working with 68 soil-conservation districts embracing a total area of nearly 40 million acres in 19 States. These districts were organized by farmers under State law for a cooperative attack on the erosion problem.

COTTON—*A Review*

THE problem of cotton is very much in the minds of all directly or indirectly dealing with the agricultural problems of the country. What to do with what we raise is being attacked from several angles. Among these is reduction of cost of production, permitting a lower price to the consumer without taking away the profit of the grower. It is thought that in this way consumption can be increased enough to absorb the amount of cotton we feel we need to grow to maintain normal agricultural relationships in the country. The appearance of the second edition of H. B. Brown's well-known book Cotton (McGraw-Hill Book Company, Inc., New York, $5.00) is thus very timely. The first edition of the book was considered one of the most complete on the subject, and the second edition has been enlarged somewhat, in addition to including revisions to keep abreast of latest developments.

Practically all phases of the subject of cotton production and use are covered, from the origin of the plant, its culture, handling, and through the mill to the final product manufactured. The scope of the book can best be indicated by the chapter headings, as follows: History of Cotton and the Cotton Industry; Taxonomy of the Cotton Plant; Cultivated Varieties of Cotton; Cotton Plants; Physiology of the Cotton Plant; Reproduction in the Cotton Plant; Cotton Fibers; Variation, Heredity, and Correlation of Characters in Cotton Plants; Cotton Breeding; Chemistry of the Cotton Plant; Fertilizers, Manures, and Rotations for Cotton; Cotton Soils and Climate; Cotton Culture; Fungous, Bacterial, and Other Diseases of Cotton; Cotton Insects; Cotton Harvesting; Cotton Ginning; Cotton Classing; Cotton Marketing; Cotton Exchanges; Economics of Cotton Production; Cotton Seed Products and Oil-Mill Processes; Uses and Spinning Qualities of Various Kinds of Cotton; Making Cotton Cloth; Cotton Statistics.

This edition follows the same general form and outline of the first edition. The material on varieties has been enlarged to include new varieties grown in this country. Sections on vernalization and factors affecting earliness of cotton have been added in the chapter on physiology. The chapters on breeding and the chemistry or analysis of the plant have been enlarged, and the fertilizer recommendation summary has been revised. Revision in methods of wilt control are noted, the problem of magnesium deficiency has been added in the chapter on diseases, and new material has been included in the section on boll-weevil control. Under cotton classification, the latest specifications for grades are given. Statistics, of course, have been brought up to date. A considerable number of new references have been added to each chapter, and in addition many minor changes have been made all through the book, resulting in a volume some 75 pages larger.

Written in a straightforward style, with material included that maintains interest as well as instructs, the book is admirably suited as a textbook. The completeness with which the subject is covered, with the elimination of distracting detail, and the numerous literature citations make the volume equally good as a reference. The format is up to the standard characteristic of the publisher's scientific books. Brown's Cotton may well we considered as one of the best books on the most important single crop in the South.

Twenty-five Years of Extension Work

(*From page* 16)

community, and better-fed and clothed girls and boys are some of its aims.

Summer camps to further recreation and social contacts, as well as give training in leadership and citizenship and stimulate boys and girls to complete their work, are held each summer in most of the States.

Leading former Florida 4-H club girls, when queried recently as to what values received in their early training had been most useful to them in later life, gave first rank to the self-reliance engendered. Knowing how to do a thing and being able to proceed without hesitancy or embarrassment are appreciated above all other things they learned. No doubt boys would give similar answers.

Friendship, contacts, and the ability to meet and mix with other people are listed by most of them as important values acquired from club work. Better ability to perform everyday household tasks in a practical and efficient manner they value also. Other values listed by the girls include: Appreciation and desire for a nice home, well-ordered; ability to do and make things, thus saving money; training to be economical through wise utilization of products at hand; knowledge of correct buying and budgeting, permitting them to live richly within their incomes; and developing of a rounded personality.

While Florida conditions are not entirely typical of those encountered throughout the United States by Extension workers, accomplishments there are sufficiently similar to be used as illustrations. Incidentally, they are the ones with which I am most familiar.

Cotton, the direct cause of extension work being instigated, has continued to play an important role. Thick spacing to secure a good set of early bolls, before weevils become numerous, and proper fertilization to feed the plants for an early crop, have become common practices. Wilt-resistant varieties and potash fertilization to overcome rust have defeated two diseases, with research and extension each playing its part.

In Florida interplanting corn and peanuts was found to reduce corn yields negligibly and to give a good crop of peanuts, which often could be sold in the form of pork for more than the corn produced on the same land. Demonstrations in a number of counties have resulted in the practice being widely followed.

Larger yields have been sought not only through fertilization, but also by thicker spacing, particularly with peanuts, soil improvement through cover crops, and use of new varieties. Improved legumes, grasses, cotton, corn, and sugarcane have been distributed from time to time by the agents, and have enhanced profits from field crops.

Although "heifers" were brought to Florida in 1520 by old man Ponce de Leon, who was seeking the fountain of youth, and cattle have been numerous and important in the State's agriculture since that time, it is only in recent years that the industry in the State has made notable progress. The cattle fever tick and mineral deficiencies for long were insurmountable obstacles.

Eradicated Cattle Tick

However, Federal and State forces have eradicated the tick from most of Florida, as from most of the Southern States, and Florida Experiment Station workers have taken the mystery out of nutritional deficiencies. County agents have shown cattlemen the efficacy of mineral supplements, purebred bulls have been brought into tick-free areas, and a goodly proportion of the more than a million cattle in Florida now dip their blue ribbons and their juicy beefsteaks to those from no other area.

Thousands upon thousands of acres have been fenced in recent years, taking cattle off the open ranges. With better cattle, cattlemen can afford to take better care of them. Around 20,000 acres a year of improved pasture grasses are set, and another 20,000 acres are mowed to keep down weeds. Huge cutting machines now clear out undergrowth of palmettos and gallberry bushes and give the grasses a chance to grow. Fertilizers are being used on a wider scale than ever before.

Demonstrations in the control of hog cholera have been important activities of county agents in Florida and other States. It is an almost universal practice now for hog men to have their shotes vaccinated when quite young to avoid losses from this plague. Reduction of parasite infestation through sanitation, and improvement in size and quality of hogs, as well as in markets, have resulted in higher incomes from pork.

Poultry Is Big Business

Primarily a woman's game in 1914, poultry has emerged into the class of big business on the farm. Florida's first poultry club agent, employed in 1916, worked mostly with women and girls, largely through "egg circles" where the group was instructed in better poultry methods and plans were developed to market eggs. A little later special "rooster days" were held when the unfortunate males were sold for chicken pie, thus assuring the production of only infertile eggs during the hot weather months.

Standardization, improvement of breeds, better feeding and marketing were fostered. Record keeping, campaigns for healthy chicks, formation of associations, culling, pox vaccination, and sanitation have been among more recent activities in this field.

Only a few other States have important citrus industries, and production problems in no two States are exactly alike. So Florida's citrus work certainly is not typical, and yet the demonstrations by extension workers have made it possible for the State's growers to stay in this once-profitable business where they would surely have lost out had old methods been followed. And Florida growers, with this help, have provided the consuming public with a most healthful and delicious food product at the cheapest prices ever dreamed.

Methods of insect control have been so well developed that growers no longer consider scale and whitefly the serious pests they were in the early days. Control of blue mold disease was made a major extension activity in 1925, and improper methods of picking and handling the fruit were shown to be responsible for most of this infection. Changed practices and a reduction in blue mold followed. Training schools in rust mite control have informed growers how to control this pest cheaply and effectively, without applying unnecessary dusts or sprays.

Although Florida's annual rainfall averages between 50 and 60 inches a year, in many years it is poorly distributed, and both trees and annual crops suffer from drouth. Grove irrigation has received definite attention for the past 11 years and is now a major operation in fruit production. An Extension Service worker developed a very desirable type of portable irrigation system in 1934 that is now widely used. Irrigation not only protects trees and fruit from serious drouth, but also lowers production costs, eliminates the necessity for pruning, increases fertilizer efficiency, and helps to control melanose disease through maintaining uniform vigor of the trees.

Bronze leaf and frenching, two serious nutritional diseases of recent years, have yielded to applications of dolomite (containing magnesium) and zinc, and dolomite is now used in 75 per cent of the groves. County agents have conducted hundreds of demonstrations with these materials.

Grove records inaugurated 8 years ago have pointed the way to production economies for hundreds of growers. They revealed that commercial fertilizers paid greater dividends than any other items of grove care, with irrigation a close second. Extensive cultivation of groves, formerly followed almost exclusively, has given way to infrequent or no cultivation, with costs but not production reduced.

Battling for Progress

Throughout the 25 years county agents in Florida, and elsewhere, have been on the firing line battling for progress in agriculture and rural home and community life. They have had a hand in every major rural activity of the times, including dairying, forestry, marketing, and cooperative purchases, soil conservation, cover crops production, fairs and exhibits, home demonstration, and a multitude of other things of which space does not permit mention.

Dr. C. B. Smith, recently retired as assistant director of the Extension Service, says: "All Extension is growing and yearly builds on its past, emphasizing what has been found successful and venturesome in looking out after whatever new things look good. Its strength has been in its educational work. Its greatest weakness is that each agent must cover so large a field of work. The hope is that the staff may always remain educators and grow in numbers, vision, and ability—each one remaining long in the service and putting his whole life into it as a professional career."

Hershey Farms Find Potash Profitable

(*From page* 22)

yields have not been entirely satisfactory. Particularly is this true where the corn is grown for grain. In recent years leaf scorch or marginal firing of corn has been quite common. Experts tell us that these are the common symptoms of potash deficiency. Recognizing these symptoms in the field and having ever before us the report of our chemist showing low potash levels on many of

our fields, a fertilizer test was laid out.

Results of our studies on three varieties in 1937 and two varieties in 1938 are presented below.

Summarizing these results briefly, the corn has shown a profitable response to potash. In both 1937 and 1938 the greatest response came from the use of potash plot yielded 34,490 pounds. To our mind this increase of 6,150 for the cost of 200 pounds of muriate of potash gave us a handsome profit.

For a number of years attempts to grow alfalfa at Hershey have met with varying degrees of success. While we have been prone to lay our failures at

1937

Variety	Fertilizer	Rate per Acre	Yield per Acre
Sure Crop	3–12–6	300 lb.	154.2 bu.
Sure Crop	3–12–9	300 lb.	170.8 bu.
Big Yellow	3–12–6	300 lb.	164.4 bu.
Big Yellow	3–12–9	300 lb.	189.2 bu.
Long's Champion	3–12–6	300 lb.	170.0 bu.
Long's Champion	3–12–9	300 lb.	176.44 bu.

1938

Fertilizer	Rate per Acre	Sure Crop Yield	Long's Champ. Yield	Av. Both Varieties Ear Corn/A.	Average per Bu. Shelled Corn
3–12–0	350	133.3	113.8	123.5	54 lb.
3–12–6	350	156.3	132.6	144.4	54 lb.
3–12–9	350	162.7	164.6	163.6	58 lb.
3–12–12	350	162.2	160.0	161.1	55 lb.

the 3-12-9 analysis. Each increase in potash up to 9 per cent gave significant increases in yields. Higher potash analyses failed to show profitable returns. Not only did the 3-12-9 give the largest yield and net return per acre, but the best weight per bushel was 58 pounds, two above legal weight and four above the no-potash plot.

Although our acreage of mangels is not large, it is an important one. Ordinarily heavily manured, yields have not been satisfactory. In 1938 we decided to give this crop a good basic fertilizer application to supplement the manure. Three hundred pounds of a 3-12-6 fertilizer were applied at seeding time. On a part of the plot muriate of potash at the rate of 200 pounds per acre was applied in bands at the time of first cultivation. When the crop was harvested and weighed the 3-12-6 plot gave a yield of 28,340 pounds, while the extra

the feet of poorly adapted seed, we are now inclined to believe that the chief offender may have been unsuitable fertility condition. Recent experiments in Massachusetts, New Jersey, and other Northeastern States indicate that past failures were more often due to improper method of incorporation of the most essential plant foods than to a desire to skimp on the fertilizer used. This year for the first time a rather elaborate series of plots was started. In the planning of this work consideration has been given to the actual amount of plant food removed by an average yield of this crop, the importance of deep incorporation of the fertilizer in the soil, and the possibilities of prolonging the period of production by intelligent mineral fertilization.

Summing up our work with fertilizers at Hershey, we would be remiss were we not again to pay tribute to our

Holstein cattle grazing on the succulent grass so prevalent on the 9,000-acre Hershey Farms, Hershey, Pennsylvania.

soil chemist who suggested potash as the weak link in our fertility chain. Skeptical though we were at first in accepting this concept, we are today somewhat more reasonable. Our results are a matter of record, and we quite frankly admit that we are busy repairing our fertility chain.

Peat Land Farming in Wisconsin

(*From page* 12)

the volume of peat soil can be maintained under grasses is not certain, but surely it will be usable in that manner for a much longer time than if intensive cultivation is followed. There is, of course, abundant peat land in the State, and hence no valid reason why certain people should not successfully utilize some of the State's peat lands for intensive truck production. Whereas judicious use cannot be criticized, abuse may well be deprecated.

In general, peat land is preëminently a hay and pasture soil, and to develop and maintain in productivity any considerable acreage of peat land, it would seem desirable to devote a considerable acreage to hay and pasture crops. On muck farms a fraction, let us say not over 1/10 to ⅓ of the peat acreage, can well be given over to special crops. Wisconsin's most outstanding muck farmers are those who have specialized in intensively cultivated crops, and have become well versed in the use of fertilizers. Too often lowland meadows on general farms go unfertilized and unmanured.

One of our farm fallacies calling for "liquidation" is that "putting land down to hay or pasture constitutes soil-fertility improvement." Most decidedly it does not, whether on peat or upland. As far as peat land is concerned, if meadows and pastures were adequately and properly fertilized with potash and phosphate, their production of hay and livestock carrying capacity could be doubled and trebled.

We have in operation a 5-year rotation consisting of 2 years of hay, followed by peas or similar crops, then root crops, and then grain in which hay crops are seeded down. This rotation could be extended to 8 or 10 years when Reed Canary grass is used for hay.

When this rotation was planned alsike and timothy were considered the best bet for a peat-land hay crop. In this rotation we plow once in 5 years, namely, the meadow, in the fall. The next year's crop may be a feed crop or cash crop but should not be a close-rowed root crop because of difficulties in using the small tools in grass roots. Manure is top-dressed on meadows and the rotational fertilizer dose (500 pounds of 0-9-40) goes on for roots.

A rather considerable number of persons on nearby uplands, who have suffered from drouth during the past decade, favor "filling in drainage ditches and returning peat lands to their native state." Such action would not prevent future drouths on uplands. It seems that the greatest good to agriculture of Wisconsin will result from judicious use of peat lands. A soil conservation problem exists on peat lands as well as uplands. Windstorm protection with strip cropping or shelterbelts, or both, deserves consideration. Secondly, it seems a good idea to grass down the peat land periodically. To exclusively muck farmers this would mean crop rotation.

It is quite possible that before the judicious use of peat lands will be fully developed they, like upland agriculture during the past century, may be obliged to pass through an exploitive stage. If so, let us hope for its short duration. Those men who pioneer in that program will deserve none the less credit for their contribution toward the advancement of Wisconsin agriculture.

Ed Blaney Cashes In On Hybrid Seed Corn

(*From page* 17)

bushels of high-grade seed corn per acre, without counting the rows that are not saved for seed, nor the shrinkage from artificial drying. Now I know that there are many farmers who do not get over 25, and the average yield for the State is only 40 bushels per acre. Besides boosting the yields, the use of fertilizer results in more well-filled ears and earlier maturity.

"During the drouth years of 1934 and 1936, we fertilized as usual, and as a result our barley netted $40 an acre at a time when many farmers did not even get their seed back. This was due to the good yield we had, and to a high percentage of large, plump kernels, which gave us the top price. In late years we have even used commercial fertilizer on our pastures and have noticed the difference."

Like all Wisconsin hybrid-seed growers, Blaney buys seed from the State Experiment Station and plants it according to State regulations. Two pure strains of corn are used, one being considered the male, and the other female. One row of the male strain is planted for every four rows of the female. No other cornfield is allowed within 40 rods of the seed field. When the corn begins to tassel out, the female rows must be detasseled so that they will be pollinated and fertilized by the male rows. This crossing results in a hybrid seed which has most of the good qualities of both parents and will produce excellent yields. The detasseling must be done promptly and rapidly, to prevent any self-pollination, and a large crew is kept busy for several weeks during this period.

When ripe, the corn is picked by hand and sorted for drying. Moisture is removed down to 13 per cent, by means of hot air currents set up in a dryer. It is then graded, according to State standards, and sacked for delivery.

Although the cost of the drying and grading equipment is no small item and his outlay for labor and fertilizer is large, Blaney's records show that every crop has paid him a good return on his investment and has rewarded him well for good management.

Potash Is Important To Farm Chemurgy

(*From page 9*)

With erosion stopped there is the additional saving of 12,000,000 tons, nonavailable for this year's crop but the rightful heritage of future generations. This must be accepted as progress. The legume, in addition, fixes an average of 200 pounds of nitrogen per acre and in some cases may add as much as 400 pounds. A concomitant benefit, of course, is the conservation of moisture, of the greatest importance in large areas and in seasons of inadequate rainfall.

Here in the South the growing of winter legumes and other cover crops has a special significance in this connection, as the winter months of heavy rainfall are the period of maximum leaching and erosion. In the North the freezing of the soil helps the situation. It is difficult to imagine any single device of more far-reaching importance and benefit related to the soil-conserving problem than the growing of winter legumes.

Aids Erosion Control

The Soil Conservation Service, it will be observed, recognizes the importance of potash as an ingredient of the complete fertilizer used to arrest erosion through the medium of cover crops. Terraces, earth dams, and fills to be held in place by vegetative growth must be provided with a protective cover before the next season of heavy rain, if they are not to be washed away. Generally they are constructed of infertile subsoil, requiring fertilization if the cover crop is to become established. The promptness with which it becomes established is of prime importance. The direct relationship between erosion and fertilization has been definitely established, the effectiveness of fertilizers in reducing erosion being little less than astonishing.

Potash appears again as a basic need in that other phase of agricultural betterment which the Council and the several governments of the nation are seeking to promote, namely, diversification. Here in the South the question is, What shall the farmer grow on the acres taken out of cotton?

First, it should be noted that the cost of cotton production is lower on restricted acreage admitting of more intensive cultural practices, including fertilization, than under the former unrestricted system—and fortunate indeed it is that the administrators of the Agricultural Adjustment laws stipulate definitely that nothing shall be done that tends to discourage the farmer in his adoption and use of efficient production methods. This is the answer to those who occasionally arise to ask, Why fertilize a crop of which there is already a surplus?

But in answer to the problem of diversification, the first suggestion is that the farmer of the South grow more of his own food and that of his urban neighbor. That a farmer can grow his own food as a side product of farm activities is self-evident. But can he feed his neighbor? We have heard much and have been much amazed to hear of the large imports, for example, of corn and pork into the South. It is easy to say to the South, Grow your own corn and pork. But by what economic side-step can the Southern farmer with land reduced in fertility to 14-bushel yield compete with the 35 bushels of the commercial corn-growing sections? The answer is soil restoration to the 35-bushel level. The shift from cotton to corn at the present productive level would obviously aggravate a situation already bad enough. The present corn acreage is large enough, perhaps too large, until fertility has been restored to a degree where the production cost is reduced to the purchase price. Legumes in the rotation combined with fertilization will accomplish that objective, as has been abundantly demonstrated by the State Experiment Stations and the farmers who follow their advice.

Diversification with food products for man and beast, grains, vegetables, fruit,

and livestock all will accentuate the need for potash. A pound of potash is required to grow the plants to produce a bushel of wheat or a bushel of unshelled corn. The appearance and substance determining market price and the shipping and keeping qualities of vegetables and fruits are dependent upon an optimum supply of potash. Livestock raising as determined by current research now being conducted in this and many other States is showing that the success of that undertaking is greatly enhanced by the fertilization of pastures, potash in particular promoting the growth of the clovers, increasing the succulence and nutritive value of the provender, and substantially prolonging the grazing season.

To promote diversification the National Farm Chemurgic Council is lending its invaluable assistance, diligently seeking ways and means whereby chemistry may provide markets for additional farm products and at the same time additional markets for existing surpluses. Chemurgic crops receiving special notice are those yielding oil, starch, and cellulose. In the growing of these crops, of course, scientific agriculture, including fertilizer use, will have to be applied if the farmer's economic status is to be improved, for obviously no benefit will accrue from increasing the number of crops to be grown at a loss. Potash, in its proper combinations with nitrogen, phosphate, lime, and other nutrients, will be found to be a basic need in this enterprise as in others where efficient agricultural production is required, since in addition to its effect on yield per acre are its vital functions in the synthesis of sugar, starch, cellulose, and oil.

Its beneficial effect on the yield and quality of cotton and flax fiber and on cellulose development in general has been determined, as likewise on starch development in corn and other grains and the root and tuber crops. In the case of vegetable oils, the proper fertilization of the tung oil tree, for example, has been shown to double the yield of nuts.

In reforestation, a matter of vital interest in the South, fertilizer containing a high potash ratio recently has been found to be most effective, particularly in the growing of seedlings where vigorous stock is the objective. The fertilization of young trees on transplanting has been shown to yield marked results in enabling them to establish themselves and get off to an early start. This is a practice being followed not only by public agencies, but by private concerns exercising foresight as to the perpetuation of a supply of forestry products.

"The Quality Element"

Likewise of major importance in chemurgy will be quality, the establishment of grades and their maintenance. Chemurgic processes for maximum efficiency will require the maintenance of these standards to which the process is best adjusted. The chemist's close scrutiny of the composition of his raw materials is inevitable. The role of potash in

A 4-8-8 fertilizer being turned under with vetch for the following crop, near Europa, Mississippi.

determining quality has gained for it the designation of "the quality element" among plant foods. In the case of other farm crops raised for industrial use, notably tobacco, where potash is used in relatively large proportions and determines quality which in turn determines the price, the fertilizer practices of the grower are frequently scrutinized by the buyer. The fermentability of tobacco, essential to its acceptance by the smoker, recently has been shown to be directly a function of the nitrogen-potash ratio of the leaf. Barley for beer and grapes for wine are other instances where the influence of potash on the growing plant shows up as quality in the finished product. The chemurgist of the past has already revealed his dependence on the quality of farm products for the quality of the commodities produced therefrom, in which he will be followed by the chemurgist of the future.

Potash—A Basic Need

In what the Nation and its several States are doing to solve the farm problem and in what this Council is doing to help, as well as what the farmer is doing to solve his own problem, potash appears as a basic need, whether it be in the operation of a farm as a "mode of life" to supply food, fuel, and shelter for a man and his family, on the one hand, or on the other as a business yielding the benefits that we like to think are the just reward of intelligent hard work under the American system. In farming for profit which depends upon low cost production with maximum yields of high quality produce for the minimum expenditure of money and effort, diversification with subsistence and cash crops, soil building and soil conservation, and reforestation, whether it be for industrial use or the prevention of erosion and flood control, potash use may easily mean the difference between success and failure.

Potash for such use is now abundantly available from the mines and chemical refineries of America and Europe. In America the industry is largely but not exclusively confined to the potash mines of New Mexico and a chemical plant in Southeastern California. As foreign sources, supplies are derived from the mines of Germany, France, Russia, Poland, and Spain, and the chemical refineries of Palestine and Chile. Here it is a new industry, undergoing its major development during the past 10 years, too brief a time in which to measure with entire confidence the extent of the deposits and reserves from which potash salts can be derived at the present low production cost. Federal and other surveys conducted during the past 28 years have revealed other resources of various low grade potash minerals, but for them it yet remains for the chemist to devise extraction processes that are successfully competitive with the existing industry here and abroad. Abroad, the industry, while old, has undergone marked expansion in recent years.

Both here and abroad the industry is characterized by up-to-date technology of the chemist and engineer, in mining, refining, handling, and transportation facilities, designed to reduce the cost of production and distribution. The major product is potassium chloride, "muriate" in the trade, of 98% purity, impurities having been eliminated to reduce freight charges. Due to the long distances over which potash salts have to be hauled to reach the farms of America, these measures were necessary if the product was to sell at a price which the farmer could afford to pay. The result now is a wholesale, delivered price as low as that of any other major plant-food element. This is an outstanding instance of what may be accomplished when chemistry is put to work for agriculture—farm chemurgy.

This Council was organized to deal with the farm problem. Since its organization, it has enlisted the advice and assistance of many eminent men from the ranks of science, business, and the

public service. While its watchword has been "Chemurgy," in its deliberations it has dealt with every phase of the farm problem. In promoting chemurgy it has not been content to consider only what farm products the chemist can use as raw materials, but recognizes as of equal importance the cost of their production and the price to be paid which will insure the permanence of the supply, namely, a farm whereon an American may live with self respect.

The search is not for additional crops to be grown at a loss. Soil mining, which may be said to characterize American agriculture, has about run its course in this country. As one editor expresses it, our farmers have long been on "relief," drawing their income from nature's treasury. Long-time crop yield comparisons between the fertilizer-using and non-using States show clearly that in the one per-acre yields have increased, while in the other they have decreased. The farmer buys fertilizer in terms of his ability to buy. Money so spent becomes working capital increasing with each turnover and adds to his income. Otherwise,, his capital, soil fertility, is drawn upon to enable him to meet the competitive price for agricultural commodities.

The Family Man

(*From page* 5)

son at the brass-railed bars. Men's heads were broken there on election nights, and bruises came when firemen held their carnivals. Revival elders periodically inveighed against the evils of the demon rum, and doughty women crusaders copied Carrie Nation for awhile.

But these precincts too have been invaded by the weaker sex, but not to ravage and destroy as was their wont. The red nose paint of the nineties (gained by frequent libations at this font of fools) gives place to rouge paint and nail polish, rubbed on by sisters sipping whisky straight. N. B. The highest rent and the greatest daily income of all the emporiums in my town today comes from cocktail lairs where Heads of Families foot the bills.

As spring approached, the old-time Family Man laid out his garden, rolled his lawn, and furbished up the funny iron bunnies and brownies set pertly here and there amongst the shrubbery. This was his big chance to air his arboreal and agricultural skill, and meanwhile he seized upon the vernal period to initiate the boys into the duties of soil and sod. His argument was that America sprang from rural roots and none of his kids would attain perfect manhood without experience akin to his own. It was a time also in which to show the family that he stood as firmly on his rights as squatter sovereignty, using his vocal ability and rugged personality in chasing the neighbor's hens and giving their adjacent owner all of his mind except a small piece. If any of us boys preferred the fishing hole he gave us the well scoured hoe and told us to hunt for worms while cultivating the beans. Yes, and he saw to it that the girls raked the leaves and picked the berries.

ONLY now and then do we find a modern parent up to such tedious tricks. Taxes are higher, yards are smaller, distant places beckon in idle hours, and you have to have a few sand traps and bunkers handy to the house on which to swing the niblick and the mashie, to practice rough going. Mother buys her greens at the grocery and the lads get their work-outs at the Y. M. C. A. Another stronghold of domestic discipline gone to thunder! It's sound economics too, for the papers claim the farmers produce nothing but surplus—so why add to it?

I do not know what the batting average is among the present Fathers as to Sabbath school devotions, but I strongly suspect something, judging by myself. Whatever I suspect might well be left

unsaid, for it is far too late to do any unsolicited salvation.

I do recall, however, that the percentage of Family Heads who once served as Sunday school principals, or ushers, or extra teachers, in a pinch, was uniformly high. It was a grand chance for them to follow through and check on their own importance and their sons' obedience in one shot.

Boot blacking of a Sunday was another rite wherein the American Family Man of other times exerted his stern authority upon each chick and child who occupied the pew. Amid much spitting and brush brandishing, the leather uppers were smeared and polished, under the cucumber vine on the back porch in summer time and in the kitchen on colder days. No other garment received his paternal zeal, because the rents and rips, the starching and the pressing belonged to the women's department.

WHEREIN today do we discern this degree of Sabbatical attention bestowed by the humble Head of the House upon the footgear of the present willful generation? Just let him approach the girls with his shine accoutrements, and see their disdainful glares! Moreover, Sunday is a day for motoring, and one set of tires does for the whole family.

As a rule the modern Pater Familias sleeps so late each seventh day that the rest of the tribe have wandered off the religious reservation ere he finishes his breakfast or the scare heads (without missing the aforesaid motto on the wall).

"Family devotions" have likewise become a dead custom in nine out of ten households, and the saying of grace at meals is replaced by shop talk, fashion notes, and school commentaries. No doubt the Family Man has lost another bit of poise and power from these omissions, but not necessarily is he thereby a godless disbeliever. One's piety is not always measured by verbal repetitions.

Why even in the eighteen nineties our little group at home began to omit these rituals. I recall that the main reason for their abandonment was the accident that happened to a miserly old uncle of ours, whose penchant for long prayers was equal to that of the Pharisee. One day our kneeling circle was rudely disturbed when the puppy started yanking at uncle's bandanna tucked into his nether pants pocket, and ere he could conclude the exhortation, the struggling cur brought forth a flat pint flask of something else than ointment for the soul.

In substance, then, we mark the passing of a phase of family leadership of the pioneering order. It was a remnant of the earlier campfires, the log hut in the wilderness, and the rude stockade, blended somewhat with the transplanted mores of the fatherlands abroad.

As America has come of age and fixed its own native traditions, the orbit of the family moves in wider circles and the duties of the boss are circumscribed thereby. Unless he has a wealth of varied experience to count upon, his position as counselor and guide is much reduced. Unfortunately, he gives up with far too smug and smiling ease, resigned to conditions as they seem to be and lacking the gumption to vary the pattern of the day and hour.

Yet I sense within him just as true an instinct of pride and as heroic attitudes of protection as those which marked the age that was and never can be here again.

GREATER perplexities and more ruthless, hidden forces are his to meet and conquer if he can. So if perchance the Family Man we know so well has lost his dignity and courtly stuffiness, if maybe he is more tolerant and less "totalitarian," let's remember that love is just as strong as ever in the normal dad, and the home is ours to model soundly on the social architecture of the times in which we live.

Looking backward to the strength and weakness of the former Family Man may urge us onward to discipline ourselves before we try it on the "company."

NEEDS TRANSPORTATION

Drunk (to splendidly uniformed bystander): "Shay, call me a cab, will ya?"

Uniformed Bystander: "My good man, I am not the doorman; I am a naval officer."

Drunk: "Aw right, then call me a boat, I gotta get home."

Golfer: "I want a boy who can count. Now, what are five, six, and three?"

Caddie: "Five, six and three, sir? Eleven, sir."

Golfer: "Come on. You'll do."

"When Mandy went and got married, us girls give her a shower."

"Dat sho' was nice. Ah'll bet her husband was glad to get 'er all nice and clean."

DINNER'S READY

Caller—"Won't you walk as far as the street car with me, Tommy?"

Tommy—"Nome, I can't."

Caller—"Why not?"

Tommy—"Cause we're gonna eat dinner soon's you're gone."

A celebrated Irish lawyer, joking with his friend, Father O'Keefe, one day, said:

"Father, I wish you were St. Peter and had the keys of heaven, for then you could let me in."

The witty priest replied:

"Better for you if I had the keys of the other place—for then I could let you out."

"Harry surprised me by telling me we were going to France on our honeymoon."

"How nice, and how did he spring it on you?"

"He said that as soon as we were married he would show me where he was wounded in the war."

Child Training Expert: "If your children become unmanageable, quickly switch their attention."

Puzzled Parent: "Their what?"

CHANGE OF SCENERY

Mother decided to take her little girl shopping with her in her car. They were ambling along to town when the girl said: "Mother, where are all the dirty dogs and swine this morning?"

Mother smiled, knowingly.

"They only come out when your father's driving," she said.

"Last night I drank seven cocktails. I wonder if I did wrong?"

"Good heavens, girl, can't you remember?"

"Stand up!" shouted the colored evangelist, "if you want to go to heaven."

Everybody got up but one old man.

"Don't you want to go to heaven, my brother?" shouted the preacher, loudly.

"Sho," said the old man, "but Ah ain't going with no excursion!"

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